

HORTICULTURAL ABSTRACTS

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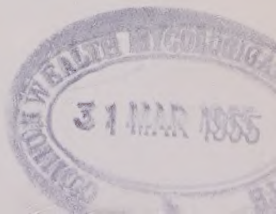
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No. 1

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EDITORIAL NOTES

A NEW FEATURE

The unsolicited statement four years ago of an eminent foreign pomologist that he habitually read *Horticultural Abstracts* from cover to cover exploded our idea that the only person to endure such a penance was the Editor.

Even then it was realized, and all the more is it realized today, that many readers must find our journal somewhat heavy going and must wonder where among all its worthy, but stodgy, nutriment are the plums of interest.

In attempts to improve its figure and make it more sprightly we have sought the advice of many competent experts, but opinions on what to include and what to omit have been so diverse as to cancel one another out, and we are still at a loss.

We have, therefore, merely tried to keep the journal in bounds by greater selectivity of originals and by harder pruning of abstracts. Despite all our efforts it persists in growing and we regret to find some truth in the recent remark of a shrewd, sardonic critic that our greatest present need is an abstract of abstracts.

Believing that he has something there we propose to put it to the test and for the greater convenience of our readers and, indeed, so that we ourselves may gain a clearer idea of where new work is leading, to do just what our critic asks and provide the said abstract.

At the beginning of each number, then, we shall draw attention to *some* of the more interesting new developments touched on in it, indicating the relevant abstracts. We realize we are thereby scrambling out on the branches, sticking our necks out, asking for trouble, since one man's interest is another man's soporific, but we venture nevertheless with emphasis on the word *some*.

And now, really important, is this digest going to lighten your burden or is the journal already sufficiently fat and cross-referenced?

Whether you are research worker or practical man, will you spare a few minutes to glance at it and a few in which to send us your comments, destructive, constructive, acidulous or mellifluous. They will all receive our grateful attention.

MACHINERY AND EQUIPMENT

Machines:—Two general papers concern machinery used for sugar cane (978) and the possibility of mechanization in the hilly tea lands of Ceylon (1006). Particular machines described are a small vegetable planter (418), a fertilizer drill for use in grassed orchards (151), new vegetable washing machines (419, 420), an onion harvester (480), a sugar cane harvester (979), a multi-purpose grader for fruits (77), a rotary weight grader for flowers (625), a tomato cleaner and grader (536) and machines for preparing compost mixtures (76). Among exotics we would class a new machine for making artificial underground mouse trails baited by a man riding on it (353).

Tools and apparatus:—New tools include a spade said to take the backache out of digging (73), two transplanting tools (74, 970) and a stalk clipper for tea (1007). Others include mechanical devices for tying vines (231), an extendable 45-ft. ladder supported by counterweights for use in coconut plantations (895) and the shear-press, an instrument for measuring tenderness in such products as peas (468).

Irrigation:—Sprinkler irrigation equipment and installation for use in the field or in glasshouses is dealt with in several papers (57, 60, 61, 67, 68, 160, 447, 764) and concrete pipe structures in another (59). Suggestions are made for more accurate methods of determining proper times for starting and for discontinuing irrigation of orchards (161), and the problem of water control for tomatoes under glass is also discussed (507). A precision plot irrigator designed for experimental purposes is described (58).

Heating for glasshouses and frames and soil sterilization:—Encouraging results are reported in Germany from the use of infra-red radiation for heating small areas in glasshouses (65). In Holland four different methods of supplying heat to tomatoes and beans under glass have produced differences in response (500). In Russia it is suggested that electrical heating of frames might usefully be supplemented by the provision of extra carbon dioxide in the frame atmosphere (66). In Britain it would appear that the very subject of electrode boilers for use in steam sterilizing soil itself engenders heat (53).

Flower pots:—Clay and peat pots are compared for French beans and melons (75), similarly clay and double perforated plastic pots for tomatoes (503). Two new pots for house plants (623) and the possibility of freeing the clay pot from algae by simple chemical methods (624) are discussed.

NUTRITION

Diagnosis of mineral deficiencies:—It is encouraging to read that in work on cacao (867) both the injection technique evolved at East Malling and the rapid tissue test methods evolved at Long Ashton have proved useful in diagnosing deficiencies in the field. Yet another possible field method of diagnosis, also worked out on cacao (869), is based on the rough determination of catalase activity as an indication of the status of iron and zinc. Reduced catalase activity has also been found in vegetables suffering from lime-induced chlorosis (41). Further refinements of the sand culture techniques described in this Bureau's T.C. 23 have been developed at Long Ashton (47) and studies have been started on the effects of reserves of micronutrients in certain relatively large seeds (466).

Leaf analysis and optimum nutrition:—Two American papers (39, 147) indicate that both woody and herbaceous crops may grow and yield equally well when there is considerable variation in leaf composition. In addition seasonal nutrient trends were found in apple leaves by other American workers (145), who suggest that a more accurate picture of these changes would be given if they were expressed on a unit leaf area basis rather than as percentages of dry matter.

Iron deficiency and lime-induced chlorosis:—Whereas iron deficiency most commonly occurs on calcareous soils, it may also be induced by high concentrations of such heavy metals as copper, manganese or zinc (774). In some cases lime-induced chlorosis can be corrected by modifying soil management practices (251), in others by spraying with iron sulphate (252, 668, 867), but often these methods have met with little success. Recent work on soil applications of chelated iron compounds to citrus affected by excess copper met with striking success and this method of curing iron deficiency has now been applied with promising results to avocados (744), cacao (867) and various ornamental shrubs (708, 734) affected by lime-induced chlorosis. Other papers on iron deficiency chlorosis deal with the need for thorough washing of leaves sampled for iron determination and with the relationship between iron concentration and chlorophyll content (775) and with the apparent genetical basis of chlorosis susceptibility in avocados (743).

Boron:—As with iron heredity would appear to be involved, at least in some crops, in varietal susceptibility to boron deficiency (441) and to magnesium deficiency (442). Two papers (30, 40) indicate that sucrose translocation in plants is directly, and hence growth substance translocation indirectly, dependent on the presence of boron, and a third paper (697) supports the hypothesis that boron also helps in the more efficient use of calcium in plant metabolism. Symptoms of boron deficiency in apples and olives are described from Italy (253).

Sodium and salt tolerance:—The importance of sodium as a plant nutrient is considered in one paper with particular reference to its relationship to potassium (42). Elsewhere work is reported on the salt tolerance of various crops (153, 486, 638, 745) and on the salt content of irrigation water (63). In one paper (745) it is shown that in avocado varieties susceptible to salt injury much more absorbed sodium is translocated from the roots to the leaves than in more resistant varieties.

Zinc and frost susceptibility:—In a tung orchard levels of zinc well above those needed to correct deficiency symptoms markedly increased frost resistance of the trees, provided adequate potassium was also present (831).

Foliage application of nutrients:—In trials on apples (148) urea applied as a foliage spray had much less stimulating effect on a grass cover crop than ground applications. In studies involving potassium applications to tomatoes (524) it was found that high concentrations of potassium applied to the foliage increased fusarium wilt disease whereas high concentrations supplied through the roots decreased it.

PACKING AND STORAGE

A new system of bulk handling for citrus packing is described from Florida (800). Trials with bulk containers for shipping citrus, tomatoes and grapes from North Africa to France are giving promising results (9). The opposing trend to bulk handling, namely the use of small packets, is represented by a study on the use of different types of consumer bags for carrots (487).

The harvesting and storage of deciduous fruits (191-200), and the storage of citrus (802-804) are considered, as also the hot water treatment of papaw fruits to control decay (940) and new forms of pack for pineapples (941). Among papers on ornamentals one is devoted to prolonging the life of cut flowers (621) and two to the use of plastic linings for the storage of lily bulbs (679) and carnation cuttings (628). For Dutch investigations on the use of wax and other coatings for the preservation of fruits, vegetables, flowers and planting stock see (78).

SMOG, SMAZE AND OTHER FORMS OF ATMOSPHERIC POLLUTION

Smogs:—Smog masks may now be bought in London.

Although Britain, and London in particular, is traditionally regarded by foreigners as almost perpetually shrouded in fog, it may be noted that three of four recent papers devoted to the subject (43-46) come from other countries. One from Holland refers to serious damage to bulb and fruit crops, while another is concerned with that suffered by crops in the Los Angeles area of California. The latter identifies the villain of the piece as certain olefinic peroxides formed when ozone reacts with vapours of unsaturated hydrocarbons derived from petroleum products. A second American paper suggests that fluorides do most of the damage, whereas a paper from the London area indicates that sulphur dioxide is mainly responsible. *Gladiolus* fans may not take gladly to the idea of the use of *gladioli* as indicator plants (46) in fluoride pollution tests.

Dusts:—Cement dust has been shown to hinder pollination of olives in Italy (819) and road and field dusts have contributed in upsetting the balance between injurious and beneficial mites in avocado orchards in California (752).

SOIL SICKNESS

In citrus experiments (768) it was found that the growth of a batch of orange seedlings was depressed by a previous crop of seedlings which only occupied the soil for 8 to 9 months. Personal observations in the autumn of 1953 suggested a similar quick effect in a German apple seedbed. Observations in Italian nurseries (258) show that soil sickness is widespread among fruit and ornamental species and that depressant effects are not confined within single species but may occur between different species.

STATISTICS

The statistician will find references to his art in papers on sampling in hops (608) and in cacao (860), on the layout of field trials for sugar cane (966) and in two papers on rubber (950, 954) the first of which deals with statistical design in general and the second with the so-called Marchal lay-out for spacing trials, and finally in a paper on the analysis of tomato yield components in terms of genotypic and environmental effects (531).

VEGETATIVE PROPAGATION

Cuttings:—The comprehensive work done in Trinidad on the many factors involved in the propagation of cacao from cuttings (861) will interest all concerned with either the practical or the fundamental problems involved. Among other papers the effects of environment are well illustrated in work on raspberry root cuttings (206) and on rhododendron stem cuttings (730). The former paper also indicates, as does another on rhododendrons (731) the importance of the season at which cuttings are taken. The effect of the nutrition of the parent plants on the rooting of cuttings taken from them is considered, not only in the cacao paper (861), but also in a study on azaleas (729). Several papers are concerned with the effects of hormones, and one in particular (760) emphasizes that different plant species respond to different hormones differently. Other papers deal with the rooting of maples (711), holly (718), various deciduous flowering shrubs (705) and with difficult subjects such as avocados (738) and chestnuts (240).

Grafting:—Yet other horticultural uses for plastics have been found in the provision of bags for enclosing tip-grafted rhododendrons (732) and for enclosing pots containing conifer rootstocks used for approach-grafting (704). With grapevines a mortise and tenon joint cut by a special machine is said to give better unions than the usual whip-and-tongue graft (225). Other papers concern the effects of climate

on success in grafting rubber (952), a new method of cleft grafting nursery stocks of deciduous fruit trees (110) and a simple cleft-grafting technique that has given good results with camellias (712).

MISCELLANEOUS

The following might be overlooked:

Senescence in trees:—Further studies by Mendel on the vitality of citrus branches (778) are commended to physiologists.

Transplanting trees:—Wrapping the stems of double budded rubber trees with paper effectively reduced mortality in transplanting (953).

Wound dressing:—A new home-made wound dressing from Israel is described (171).

Biological uncontrol:—In several industries, of which sugar cane is one, biological control of pests has become an accepted practice. It may therefore come as a shock to find that the importation of parasites and of hosts carrying parasites may sometimes be the means of introducing pathogenic organisms into new areas (987).

Name this child!:—The promising fungicide we believe to be composed of n-trichloromethylthio-tetrahydrophthalimide is variously referred to as Fungicide 406, Orthocide 406, SR 406 and most recently as Captan (see 289, 290, 294, 304, 359, 360 among others).

"—and from sudden death":—Lastly those who seek for human documents could do worse than consult the originals of (885) and (886) on sudden death in the clove trees of Zanzibar and on deliverance therefrom and its attendant problems.

MISCELLANEOUS.

General.

(See also 79a, o, p, s, w, 1021, 1058n.)

1. LUCHINI, R.

L'Argentina e la sua agricoltura. (Argentina and her agriculture.) [English summary 7 lines.]

Riv. Agric. subtrop., 1953, 47: 125-57.

A useful account of Argentina and her agriculture. Notes are given on the 6 natural geographical regions, the 5 climatic zones, water supplies and the 4 agricultural regions. There are also short sections on the different provinces (including climatic data and acreages under chief crops), and on individual crops including sugar cane, tung, yerba maté, tobacco, vine, olive and deciduous fruits.

2. REID, R. D., AND LOVATT, B. A.

Horticulture in Lanarkshire. I. Hardy fruits. II. Glasshouse and associated crops.

Scot. Agric., 1953, 33: 36-40, 95-8, bibl. 3.

I. Fruit growing. The acreage under small fruit in the Clyde Valley decreased from 2,260 to 921 during the period 1908-52 and that of top fruit from 761 to 489. Victoria plums are considered to offer the best prospects of all fruits, and the area under plums has actually increased. **II. Glasshouse crops.** About one-half of the tomatoes produced in Scotland are grown in Lanarkshire, often with tulips and chrysanthemums as ancillary crops. Economic and other aspects of the industry are discussed.

3. KEMMER, E., AND OTHERS.

Festschrift zur 50. Wiederkehr der Verlegung der Höheren Gärtnerlehranstalt von Wildpark (1824-1903) nach Dahlem (1903-1953). (Jubilee volume commemorating the transfer of the Horticultural College from Wildpark (1824-1903) to Dahlem (1903-1953). Tech. Univ. Berlin-Charlott., Abt. Gartenb. 1953, 9×6 in., pp. 134, bibls., illus.

An introduction by Professor Kemmer, who discusses the significance of the jubilee [see also *H.A.*, 23: 2], is

followed by papers reflecting the activities of the different institutes. Abstracts of these papers appeared in *H.A.*, Vol. 23, No. 4.

4. ROUQUEROL, P.

Purpose and aims of the International Potash Institute.

SCHMIDT, W.

The International Potash Institute and the organization of its management.

Potash Rev., exp. Res. Work, 4th suite (Sept. 1953), pp. 3½, and 5th suite (Oct. 1953), pp. 4½, respectively.

The International Potash Institute was established at Berne, Switzerland, in September 1952. The papers were read by two of its Directors at the first meeting of the Technical Advisory Council.

5 OKITSU HORTICULTURAL EXPERIMENT STATION.

Abstracts of the reports published by the National Okitsu Horticultural Experiment Station 1903-1951. [Japanese.]

Historical sketch of the National Okitsu Horticultural Experiment Station. [Japanese.]

[*Publ.*] *Hort. Div. nat. Tokai-Kinki agric. Exp. Stat. Okitsu, Japan*, 1952, pp. 143 and 79 respectively, being *Commem. Issue 50th Foundation nat. Okitsu hort. Exp. Stat.* I and III respectively.

The first brochure contains a table of contents (pp. 6½) in English. The abstracts, which are in Japanese, deal with fruit growing (citrus, persimmon, peach, chestnut and others), vegetable growing, pathology, entomology, and chemistry and processing.

6. MINISTRY OF AGRICULTURE, LONDON.

Agricultural Statistics U.K. Part II. Output and utilization of farm produce in the agricultural years 1943-1944 to 1949-1950. H.M.S.O., Lond., 1953, pp. 46, 2s. 6d.

Gross details are given on p. 9 of the quantity and value of fruit and of vegetables produced in the years named. The value of both fruit and vegetable production rose until 1948, when it started to decline. Tables which follow differentiate between vegetables in the open, under glass and not grown primarily for sale, and give additional figures for flowers and nursery stock. Tables 19 and 20 give respectively the values and quantities of fruit, vegetables and flowers produced, differentiating between top, soft and glasshouse fruit and between different types of vegetables.

7. BERGGREN, Å., AND FJÄDERHANE, A. M. *Arbetsstudier i trädgårdssodlingen. (Time studies in horticulture.)*

Medd. Alnarpinst. trädgårdsekon. Byrån 14, 1953, pp. 39, illus.

For a brief outline of the time study scheme see *H.A.*, 23: 1434. The analyses presented in this bulletin cover a wide range of operations, specialized and general, from fruit tree budding to the felling of trees and the spreading of fertilizer.

8. KEMMERS, W. H. *Marktonderzoek. (Market research.)* [English summary 10 lines.] *Meded. Dir. Tuinb.*, 1953, 16: 627-37.

A discussion of the importance of market research and the methods available, with special reference to fruits and vegetables.

9. N., E. *Essais de transport de fruits par containers aérés. (Fruit transport trials with ventilated bulk containers.)* *Fruits d'Outre Mer*, 1953, 8: 354-7.

Sample consignments of oranges, tomatoes and grapes were sent by land and sea from North Africa to Paris in specially designed ventilated (natural or forced draught) bulk containers, records being kept of humidity and temperature in the containers during the journey. [For other recent articles on bulk containers see *H.A.*, 22: 1836 and 4286.] The fruit arrived in very good condition and transport costs were considerably lower than normal. It is recommended that ventilated bulk containers should (1) be collapsible; (2) be suitable for other goods besides perishable fruit and vegetables; (3) provide protection from moisture and contamination; (4) permit easy handling inside the container; (5) have 2 doors on opposite sides; (6) have a free space of 10 cm. below the engine (if any); (7) be able to accommodate an intermediate floor that does not interfere with ventilation; and (8) have overall dimensions of 2 m. in height (interior measurement not less than 1.7 m.), 2.3 m. in length and 1.8-2.5 m. in width (the optimum width, 2.25 m., gives a capacity of 8 cu. m.). Air should be admitted at the base and evacuated at the top, and the rate of ventilation should be equivalent to a renewal of 800 cu. m. air per hour at a speed of 50 km. per hour for an empty container. The ventilating apparatus should be simple and robust and have 3 positions: shut, half open, and open. The walls and ceiling of the container should have an inner covering designed to prevent condensation on the goods.

10. COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS.

New and promising varieties recently described in the literature (8th issue).

[*Publ.*] *Bur. Plant Breed. Genet. Cambridge*, 1953, pp. 52, 6s. or 85 c.

The varieties listed include those of top and soft fruits, tropical and sub-tropical crops (guava, tung and avocado), nuts, vegetables, hops and tobacco.

Biochemistry.

(See also 79g, y, 80d, i, 542a.)

11. FORSTER, W. A. **The determination of copper in plant material.** *Analyst*, 1953, 78: 614-16, bibl. 5.

In the presence of the ammonium salt of ethylenediaminetetraacetic acid, copper can be determined colorimetrically as the diethyldithiocarbamate complex without interference from aluminium, cobalt, iron, manganese, nickel, zinc, calcium, magnesium and phosphorus. The method is rapid and analyses of 24 plant digest solutions by the new method and by a dithizone procedure were in close agreement. [Author's summary.]—Long Ashton Res. Stat.

12. FORSTER, W. A. **The determination of nickel in plant material in the presence of other metals.** *Analyst*, 1953, 78: 560-2.

A description is given of a procedure adopted at Long Ashton combining the method of Sandell with that of ter Haar and Westerveld.

13. MOIR, K. W. **The determination of oxalic acid in plants.** *Qd J. agric. Sci.*, 1953, 10: 1-3, bibl. 4.

A titrimetric adaptation of Myers' modification of Bau's gravimetric method for determining water and acid extractable oxalate in plant material is described. [Author's summary.]

14. HOSKIN, F. C. G., AND OTHERS. **Production of acetate by higher plants, as determined by the isotope dilution technique.** *Amer. J. Bot.*, 1953, 40: 502-7, bibl. 16.

Radioactive acetate was introduced into 10 different genera of Spermatophyta including tomato, castor bean, kidney bean, tobacco, geranium and bryophyllum, and plants were placed under different external conditions for 12 hrs. At the end of this time acetate left in a plant was extracted and its specific activity determined. A method is suggested for calculating the amounts of acetate produced by a plant, when rates of its production and utilization are not equal. Synthesis of acetate was observed in every species tested.—Queen's Univ., Kingston, Ontario.

15. PAECH, K. **Über gewisse noch nicht identifizierte Inhaltsstoffe höherer Pflanzen. (On certain unidentified substances in higher plants.)** *Planta*, 1953, 42: 56-63, bibl. 4.

On the addition of phloroglucin (low concentration) and weak mineral acids, aqueous extracts of many horticultural plants yielded a purple dye which showed great similarity to natural anthocyanin. The final identification of the labile substance giving this reaction

with phloroglucin has so far not been possible, but its probable nature and function are discussed.—Tübingen Univ.

16. SHAW, F. R., FARR, T. H., AND GOLDSTEIN, H. L.
Sugar concentration of some Massachusetts honey plants.

J. econ. Ent., 1953, 46: 521-4.

The sugar concentrations of some 40 honey plants were determined by means of a hand refractometer. They were grouped according to the average sugar concentration of nectar. Plants having an average sugar concentration above 50% were: apple, European lime and *Aster vimineus*. The second group, having an average sugar concentration of 40-50%, did not include any horticultural plants. Plants in groups I and II were in general preferred by bees to plants in groups III and IV, having average sugar concentrations of 30-40% and below 30% respectively.

17. TOMBESI, L.

Modulo enzimatico e coefficiente ossidativo di alcune specie vegetali. (The enzymatic pattern and oxidase coefficient of certain plants.) [English summary $\frac{3}{4}$ p.]

Ann. Sper. agrar., 1953, 7: 1565-96, bibl. 7.

The results are given of a biochemical study in which the enzymatic pattern and oxidase coefficient of some 60 economic plants were studied. These show that the quantitative distribution of enzymes is in accordance with systematic, proportional and evolutionary criteria. With some exceptions the dicotyledons studied contained O_2 activators of the ascorbic and catechol-oxidase type, whereas these enzymes were seldom found in the monocotyledons. The following relationships were observed: (1) species with high oxidase activity, which come early in the series, have a low carbonic anhydrase activity; (2) oxidases of the catechol-oxidase type are more abundant than the ascorbic oxidases only in the early part of the series, ascorbic oxidases becoming more abundant with increase in carbonic anhydrase activity; (3) the mean ascorbic acid/mean oxidase activity ratio is lower at the beginning of the series and increases with increase in carbonic anhydrase; and (4) reduced glutathione increases with carbonic anhydrase in most species. Analytical data are given for some 50 species including tobacco and many horticultural and some plantation crops.—*Staz. chim. agrar. sper.*, Rome.

Physiology.

(See also 79f, h, m, z, 80c, j, 378, 416, 778.)

18. ROBERTSON, R. N.
Conference on cell physiology.
Aust. J. Sci., 1952, 14: 151-3.

Notes are given on the C.S.I.R.O. conference on "The Physiology and Structure of Intracellular Bodies" held at Cronulla in August 1951. Papers were read on the relation between the nucleus and plasmogones (S. Smith White), similarities between plant and animal mitochondria (R. N. Robertson), chloroplasts (F. R. Whately), the connexions between chloroplasts and nucleus (E. M. Hutton), cell wall structure and the influence of the cytoplasm in governing micellar

orientation during growth (A. B. Wardrop), and the surface of plant cells (F. V. Mercer).

19. PISEK, A., AND WINKLER, E.
Die Schliessbewegung der Stomata bei ökologisch verschiedenen Pflanzentypen in Abhängigkeit vom Wassersättigungszustand der Blätter und vom Licht. (The influence of light and of foliar water saturation on the closing of stomata in ecologically differing plant types.)

Planta, 1953, 42: 253-78, bibl. 27.

The following plants were included in the investigation: *Arctostaphylos uva ursi*, *Rhododendron* spp., *Vaccinium* spp., olive.

20. BREAZEALE, E. L., AND MCGEORGE, W. T.
Influence of atmospheric humidity on root growth.

Soil Sci., 1953, 76: 361-5, bibl. 5, illus., being *Tech. Pap. Ariz. agric. Exp. Stat.* 323.

Tomato and corn plants were grown in nutrient solutions with their tops in sealed bell jars in which humidity was controlled at high levels (85-95%) or very low levels (2-5%). By alternating high and low humidities for periods of 48 hrs it was shown that a significant relationship existed between the humidity of the atmosphere surrounding the aerial parts of the plants and the rate of root elongation. It is concluded that moisture absorption through the leaves actively stimulated root growth.

21. HANSON, J. B., AND BIDDULPH, O.
The diurnal variation in the translocation of minerals across bean roots.

Plant Physiol., 1953, 28: 356-70, bibl. 20.

A diurnal variation has been found to exist in the ability of Red Mexican bean roots to translocate absorbed rubidium and phosphate to the shoots. The maximum translocation occurs about midday, the minimum about midnight. The source of variation appears to reside in some obscure property of the root cytoplasm. [From authors' summary.]—*State Coll. Wash.*, Pullman.

22. SNIJDERS, J. H.
Fasciatie als teratologicum in cultuurge-
wassen. (Fasciation as an abnormality in
cultivated plants.)

Indon. J. nat. Sci., 1953, 109: 82-5, bibl. 6, illus.

Work that has been done on the subject is briefly reviewed. It is concluded that fasciation is the result of a somatic mutation. Since this is hereditary it gives rise to highly specialized ornamental plants. The question of whether fasciated plants should be considered normal or abnormal is discussed.

23. VAN DER PIJL, L.
The shedding of leaves and branches of some tropical trees.

Indon. J. nat. Sci., 1953, 109: 11-25, bibl. 9, illus.

The author describes some special types of leaf and branch abscission that occur in tropical trees, and suggests that the present concepts of abscission could be expanded by a study of such tropical plants. He distinguishes 3 types of leaf joint, namely the pulvinus,

the growth joint and the abscission joint. With regard to stem abscission, 2 types of stem can be distinguished in the Gymnosperms: (1) with abscission in all nodes, and (2) with abscission in the basal swelling only. The abscission behaviour of certain tree species is described in detail.

24. GRÜMMER, G.

Die gegenseitige Beeinflussung höherer Pflanzen—Allelopathie. (Mutual influences in higher plants—allelopathy.)

Biol. Zbl., 1953, 72: 494-513, bibl. pp. 8.

The term "allelopathy" comprises all processes in which specifically acting metabolites of one higher plant exert an influence on another higher plant. Starting from Molisch's studies on ethylene the literature on the following phenomena is reviewed: (1) Gaseous and other emissions from the above-ground organs of higher plants; (2) root secretions, with special reference to the problem of soil sickness; (3) plant associations, with special reference to mixed cropping; (4) relations between weeds and cultivated plants; (5) compatibility in grafted plants; (6) parasitic higher plants and their hosts; (7) germination of pollen mixtures; (8) the effects of radiation issuing from higher plants.

25. OVČAROV, K. E.

The effect of vitamins on plants. [Russian.]

Priroda, 1953, 42 (6): 88-91.

A review of Russian work on the importance of vitamins for plant growth. Numerous examples are quoted showing how vitamins (riboflavin, thiamin, piridoxin, carotene) applied to either foliage, seed or flower during pollination improved crop production.

Growth substances.

(See also 79d, i, n, r, 80k, 134, 173-175, 177, 179-189, 216, 227, 228, 236, weeds and weed control section, 477, 481, 482, 489, 512, 513, 533, 542q, 560, 561, 645, 965, 977, 1018.

26. LINSER, H., AND MASCHKE, F.

Kolorimetrische und biologische Bestimmung sowie chromatographische Trennung von Wuchsstoffen aus Pflanzen. (The chromatographic separation of plant growth substances and their colorimetric and biological estimation.)

Planta, 1953, 41: 567-88, bibl. 11.

After chromatographic separation on aluminium oxide columns, growth substances from plant extracts were estimated according to Linser's paste test. A quantitative determination of indole-3-acetic acid was also made colorimetrically by means of the perchloric acid reaction according to Gordon and Weber. In biological tests the growth substances adsorbed on Al_2O_3 columns from brassica extracts had a stronger action than that accounted for by the IAA content. This suggests that a second growth substance distinct from IAA is also adsorbed by Al_2O_3 . Chromatographic filtrates of brassicas were found to contain considerable amounts of indole-like substances, which are not IAA, and of other growth substances of a non-indole nature. The total growth substance concentration in the tissue juices of brussels sprout shoots and roots was approximately of the values $2 \times 10^{-1}\%$

and $4 \times 10^{-3}\%$ respectively (in equivalents of IAA action). In the above-ground parts of tomato plants the colorimetric determination yielded only 2.8 mg. %, whereas values of 45.5-116.6 mg. % were obtained for the above-ground organs of brassicas. Tomato, cauliflower, cabbage, brussels sprout, savoy and horse radish were used as test plants.

27. AUDUS, L. J., AND THRESH, R.

A method of plant growth substance assay for use in paper partition chromatography.

Physiol. Plant., 1953, 6: 451-65, bibl. 6.

Great sensitivity to small amounts of IAA is the main advantage claimed for the method of assay described; it involves the growth responses of sections excised from the growing zone of pea roots.—Bedford Coll., London Univ.

28. WIEDOW, H.-L., AND V. GUTTENBERG, H.

Über die Abhängigkeit der Wirkstoffbildung von Licht und Photosynthese. (The influence of light and photosynthesis on the formation of growth substances and vitamins.)

Planta, 1953, 41: 589-612, bibl. 48, illus.

With bean plants grown in the light in CO_2 -free air auxin formation was induced by the addition to the medium of heteroauxin or vitamin C. It is concluded that auxin synthesis proceeds independently of photosynthesis, though the presence of light was found to be necessary. Similarly, heteroauxin showed no relationship to photosynthesis; its synthesis appeared to be possible in the dark. The formation of vitamin C depended on the presence of sugar reserves. Photosynthesis promoted the synthesis of both vitamin B₁ and vitamin C.—Rostock Univ.

29. GALSTON, A. W., AND BAKER, R. S.

Studies on the physiology of light action.

V. Photoinductive alteration of auxin metabolism in etiolated peas.

Amer. J. Bot., 1953, 40: 512-16, bibl. 21.

Alaska peas were grown either in complete darkness or in the presence of continuous red light of intensity 550 ergs/cm.²/sec. At the age of 7 days, sub-apical epicotyl sections were excised and grown in darkness in solutions containing 0, 0.01, 0.1, 1.0 and 10 γ /ml. indoleacetic acid (IAA). The sections derived from plants grown in complete darkness made optimal growth at 0.1 γ /ml., while those derived from red-light exposed plants required 10 γ /ml. to produce the same growth. Thus, pretreatment with red light decreased by a hundredfold the sensitivity of pea sections to auxin. A similar red-light-induced decreased sensitivity to auxin was noted in a root-initiation test. A minimum dose of about 1,980 kiloergs/cm.² of red light produces the maximal physiological response if given about 18 hrs prior to the section growth test; about half the maximal response if given 6-8 hrs prior to the section growth test; and no response at all if given more than 24 hrs prior to the growth test. Thus the effect of red light on response to auxin is amplified in time up to about 18 hrs, then decays rapidly to zero at 24 hrs. Pre-treatment with red lights results in a greatly decreased removal from solution of exogenously supplied IAA. This effect could explain the apparent decreased sensitivity to auxin of pre-irradiated epicotyls. The overall reaction pattern of etiolated peas to red

light resembles in many respects the reactions of photo-periodically sensitive plants to light flashes. An understanding of these photo-induced alterations of auxin metabolism in etiolated peas will probably help to clarify the mechanism of the photoperiodic reaction. [Authors' summary.]—Calif. Inst. Technol., Pasadena.

30. MITCHELL, J. W., DUGGER, W. •M., Jr., AND GAUCH, H. G.

Increased translocation of plant-growth-modifying substances due to application of boron.

Science, 1953, **118**: 354-5, bibl. 7, illus.

The investigation was undertaken to determine whether boron would accelerate translocation of 2,4-D and other growth regulators from leaves to stems of bean plants by affecting translocation of sugars. Stem curvature was used as a measure of translocation. In one of the experiments described, in which several sugars were applied with the ammonium salt of 2,4-D and B, it was found that B with sucrose increased stem curvature by an average of 235, with fructose 427 and with glucose 1,520% over that observed on plants not receiving B. It is concluded from all the results obtained that the accelerating effect of B observed in these experiments was directly upon movement of sugars and that translocation of growth modifiers was thus indirectly accelerated.

31. McRAE, D. H., AND BONNER, J.

Chemical structure and antiauxin activity.

Physiol. Plant., 1953, **6**: 485-510, bibl. 39.

Each of the substances here investigated and shown to be an antiauxin can be considered as derived from an active auxin by elimination of one of the structural features essential to auxin activity. [From authors' summary.]—Calif. Inst. Tech., Pasadena.

32. TORREY, J. G.

The effect of certain metabolic inhibitors on vascular tissue differentiation in isolated pea roots.

Amer. J. Bot., 1953, **40**: 525-33, bibl. 30, illus.

Five mm. Alaska pea roots excised from 48-hr germinated seed and grown in a synthetic nutrient medium in Petri dishes in the dark were treated with the known chemical inhibitors of root elongation, indoleacetic acid, iodoacetic acid and 2,4-dinitrophenol, at concentrations causing approximately 90% inhibition of root elongation. A detailed histological study was made of these inhibited roots, using serial transverse and longitudinal sections, in an attempt to relate biochemical processes of the root tissues to the differentiation of primary vascular tissues. At a concentration of 5.7×10^{-6} M (1 mg./l.), indoleacetic acid almost completely inhibits root elongation but markedly accelerates the maturation of primary xylem elements while having little effect on the differentiation of primary phloem. Iodoacetic acid at 10^{-4} M. at pH 4.9, a concentration reported to inhibit strongly aerobic respiration in root tissues, causes slight acceleration of primary xylem maturation while inhibiting root elongation. Secondary wall formation of the primary xylem elements was abnormal under iodoacetate treatment, with protoxylem elements showing reduced secondary wall thickening and lignification. 2,4-dinitrophenol, an inhibitor

which has been shown to uncouple aerobic respiration from the phosphorylative system, at a concentration of 10^{-4} M at pH 5.0, completely stops primary vascular tissue differentiation as well as root elongation. It is pointed out that the action of all three inhibitors centres around cellular processes associated with carbohydrate metabolism. Thus, by use of chemical inhibitors, it has been possible to modify the usual sequence of primary vascular tissue differentiation in these roots. [Author's summary.]—Univ. Calif., Berkeley.

33. JACOBS, W. P., AND BULLWINKEL, B.

Compensatory growth in coleus shoots.

Amer. J. Bot., 1953, **40**: 385-92, bibl. 16, illus.

Excising the axillary buds and branches from a clonal stock of *Coleus* induced compensatory growth of the main shoot. This was manifested in greater size of leaves, longer stems and a faster rate of unfolding leaves from the apical bud. When auxin paste was added to the axillary stumps, the results indicated that the compensatory growth was not due to release from an auxin inhibition. Excising the young leaves on the main shoot, in addition to excising the axillaries, induced still further compensatory growth in the leaves just below the excised zone, caused a very marked drop in stem elongation in the excised zone, and increased the rate at which leaves were unfolding from the apical bud. Auxin added to the petiolar stumps of these young leaves again had no effect on the compensatory growth of the leaves, but did restore a large part of the drop in stem elongation which was associated with excision of the younger leaves. The rate of leaf-unfolding was also significantly increased by added auxin. The results indicate that compensatory growth acts primarily on the leaves and that the leaves, in turn, induce greater growth of the stem. [From authors' summary.]—Princeton Univ., N.J.

34. ALLEN, E. K., ALLEN, O. N., AND NEWMAN, A. S.

Pseudonodulation of leguminous plants induced by 2-bromo-3,5-dichlorobenzoic acid.

Amer. J. Bot., 1953, **40**: 429-35, bibl. 15, illus.

Descriptions are given of the effect of 2-bromo-3,5-dichlorobenzoic acid on the root growth of *Lens esculentum*, *Pisum sativum*, *Arachis hypogaea*, *Glycine max*, *Vigna sinensis* and *Phaseolus vulgaris*. The growth substance caused reduction of fibrous rootlet development, abnormal root-tip swellings, and the proliferation of pseudonodular outgrowths along the upper main root system. Histological studies indicated that these pseudonodular outgrowths were modified rootlets. High concentrations of the chemical suppressed nodulation of the roots by rhizobia.

35. RACK, K.

Untersuchungen über die Bedeutung der Verwundung und über die Rolle von Wuchsstoffen beim bakteriellen Pflanzenkrebs. (Studies on the significance of wounds and the role of growth substances in the development of crown gall.)

Phytopath. Z., 1953, **21**: 1-44, bibl. 101, illus.

(1) The following experimental results suggest that mechanical injury leading to the formation of new cells is a specific condition for the induction of crown gall: (a) The mere presence for many weeks, without the tissue being damaged, of numerous crown gall bacteria in the intercellular spaces of *Kalanchoe blossfeldiana* and *Bryophyllum daigremontianum* leaves did not result in tumour formation. (b) Even under optimum conditions for the bacteria following the injection of nutrient solutions or host extracts into the intercellular spaces no tumours were formed. (c) The tumours occurring without artificial injury in the axils of young *Bryophyllum* leaves are formed in tissues injured naturally by the differentiation of brood buds. (2) Tumours were also induced by burns, treatment with dry ice or KOH. (3) Neither the exposure of protoplasts nor the intercellular presence of bacteria appear to be prerequisites for tumour formation. (4) Proliferations were induced by synthetic growth substances at 31° C., a temperature at which bacterial tumours are no longer formed. Several aspects of the theory of tumour formation are discussed. Tomato plants were also used in the investigation.

36. SILBERGER, J., JR., AND SKOOG, F.
Changes induced by indoleacetic acid in nucleic acid contents and growth of tobacco pith tissue.

Science, 1953, **118**: 443-4, bibl. 5.

In tobacco pith tissue disks cultured on a sucrose agar medium the addition of IAA over a wide concentration range produced the following results: (1) both pentose nucleic acid (PNA) and deoxyribose nucleic acid (DNA) contents in IAA-treated tissue rose above control values before an increase in fresh weight became apparent; (2) nearly maximal effects of IAA on PNA and DNA were reached within 4 days; (3) DNA increased most at ca. 0.014 mg./l. IAA, whereas the optimal concentration for PNA increase was at least a hundredfold higher; (4) in time fresh weight increase became proportional to PNA increase over a wide range of IAA concentrations; and (5) material fixed and sectioned showed a correlation between cell division and DNA increase at low IAA concentrations, but at IAA concentrations optimal for cell enlargement and PNA content no cell divisions were found in spite of increases in nuclear material.

Seed treatment.

(See also 417, 421, 422, 444, 619, 703, 1035, 1061f, g.)

37. MAYER, A. M.
Quantitative aspects of the behaviour of coumarin as a germination inhibitor.

Physiol. Plant., 1953, **6**: 413-24, bibl. 6.

The germination of lettuce seeds in a constant concentration of coumarin showed appreciable day to day variations. These variations could be related to both the disappearance of coumarin from the external solution and to the internal recovery of coumarin. The internal recovery was much lower than the amounts applied or the amounts disappearing from the solution. Germination or non-germination could not be related to the amounts of coumarin recovered. Seed extracts were shown to inactivate or destroy large amounts of coumarin. Pre-treatment of seeds with coumarin prior

to the preparation of the extracts destroyed their ability to destroy coumarin. It is suggested that the inactivation of coumarin is affected by a process which involves its reaction with some essential metabolite produced enzymatically. The exhaustion of this metabolite or the diversion or inactivation of the enzyme leads to failure to germinate. [Author's summary.]—Hebrew Univ., Jerusalem.

38. STOLP, H.

Beiträge zur Frage der Beziehungen zwischen Mikroorganismen und höheren Pflanzen. (Contributions to the problem of relations between micro-organisms and higher plants.)

Arch. Mikrobiol., 1952, **17**: 1-29, from abstr. in *Zbl. Bakt.*, 1953, **107**: 70-1.

A method has been evolved for the sterilization of seeds and fruits which guarantees both complete disinfection and 100% preservation of the germination capacity. The technique, which is described in detail, involves pre-treatment with a bromine solution in a closed apparatus. The experiments were carried out with pea and maize, 30-40% of whose seeds and fruits showed internal infection.

Nutrition.

(See also 79j, t, u, 80b, e, 142-153, 250-257, 1052.)

39. THOMAS, W., MACK, W. B., AND SMITH, C. B.

Leaf concentrations of five elements in relation to optimum nutrition of a number of horticultural crops.

Bull. Pa agric. Exp. Stat. **564**, 1953, pp. 16, bibl. 13.

Results of some foliar diagnosis studies which have been presented in detail elsewhere are expressed in terms of standard values. Percentages of nitrogen, phosphorus and potassium and in most cases calcium and magnesium in leaf samples are recorded, which were found to be associated with maximum yields in various fertilizer experiments with a number of horticultural crops. The range of each of these elements is also given for each crop. Other environmental conditions are described which were observed during the growth and development of the crops examined, which include potatoes, tomatoes, snap beans, sweet corn, field corn, apple trees of several varieties and ages, and peach trees. Evidence is produced to justify the assumption that the maximum yields in these experiments are optimum or nearly so for the species, variety, and the prevailing environmental conditions other than nutritional. It is particularly significant that in only a few instances is the optimum yield associated with the maximum percentage composition with respect to a particular element, which was found in leaves of the same variety taken at the same time; in most cases the optimum concentrations are well within the range of concentrations found. This fact tends to confirm the assumption that proportions of the fertilizer elements, or the qualitative as well as the quantitative aspect of nutrition, is important in determining development and yield. Another significant fact which is evident from the data presented is that the percentage composition of the leaves with respect to all of the elements exam-

ined varies greatly during the course of development, both in the optimum, where seasonal trends are distinct in most cases, and in the range found at a given period of sampling. [From authors' summary.]

40. GAUCH, H. G., AND DUGGER, W. M., Jr.
The role of boron in the translocation of sucrose.

Plant Physiol., 1953, 28: 457-66, bibl. 26.

An hypothesis is presented and supported with experimental evidence to account for one essential role of boron in plants. The data suggest that one role involves a reaction of boron with sugar to form a sugar borate complex (ionizable) which moves through cellular membranes more readily than non-borated, non-ionized sugar molecules. Studies employing the Warburg apparatus were indicative of greater O_2 uptake by lima bean and pea root tips in the presence of sucrose plus 5 p.p.m. of boron, as compared with sucrose alone. A tentative interpretation of the increased (50 to 85%) respiration was that it was the result of an increase in the movement of sucrose (or its hydrolytic products) to the respiring cells. Five p.p.m. of boron had no effect on the endogenous respiration. By employing uniformly labelled sucrose both alone and in the presence of 10 p.p.m. of boron, it was shown that there was a striking dependence of translocation of sugar on the presence of boron. When a leaf of a tomato plant was immersed in a labelled sucrose solution containing 10 p.p.m. of boron, the stem tip of the plant had 550% more radioactivity than if the solution contained no boron. Data are presented which may be interpreted as evidence for the fact that sugar does not move readily through cellular membranes unless the sugar is borated. It is submitted, therefore, that boron deficiency symptoms are an expression of sugar deficiency in the cambia, stem tips, root tips and flowers or fruits. [Authors' summary.]

41. BROWN, J. C.
The effect of the dominance of a metabolic system requiring iron or copper on the development of lime-induced chlorosis.

Plant Physiol., 1953, 28: 495-502, bibl. 7.

Red kidney beans and tobacco grew well on a copper-deficient organic soil, but developed chlorosis on a calcareous soil. Tomatoes grown on the calcareous soil became chlorotic and also showed a small response to copper. The catalase activity was lower in lime-induced chlorotic plants than in normal green plants, but there was no significant change in the peroxidase activity. Ascorbic acid oxidase in the chlorotic plants was about the same as that in the normal plants. Ascorbic acid oxidase activity appeared to be a good index of the available copper supply, whether the plant did or did not show visual copper-deficiency symptoms. [From author's summary.]—Bureau Plant Ind., Beltsville, Md.

42. LEHR, J. J.
Sodium as a plant nutrient.

J. Sci. Food Agric., 1953, 4: 460-71, bibl. 25.

The importance of sodium for different agricultural crops is discussed in relation to the replacement of potassium by sodium and independent sodium effects. Most of the plants which come under discussion are agricultural, but the author also makes a tentative

classification of crops according to the effect on yield of such replacement or independent action, in which cabbage, coconuts, rubber and turnips appear next to the Chenopodiaceae in their potential tolerance of, or even benefit from, sodium. Another table, reproduced from an article by Harmer and Benne in *Soil Science* for 1945, also shows the effect of sodium applied as a nutrient on many horticultural crops, the degree of benefit being noted (1) where potassium is deficient, and (2) where potassium is sufficient.

Atmospheric pollution.

43. TEN HOUTEN, J. G.

Luchtverontreiniging door industriegassen en de nadelige gevolgen voor land- en tuinbouw. (Air pollution caused by industrial smoke and its effect on agriculture and horticulture.) [English summary 11 lines.] *Meded. Dir. Tuinb.*, 1953, 16: 675-88, bibl. 19, illus.

Literature on the damage caused to plants by air pollution is reviewed, and the symptoms of damage caused by SO_2 , HF, oxidized unsaturated hydrocarbons and growth substances are described. Serious injury has recently been observed in some areas in the Netherlands. An account is given of damage to bulb crops, especially gladiolus, observed near Velsen, and to fruit crops near Pernis. Mention is made of differences in varietal susceptibility.

44. METCALFE, C. R.

Effects of atmospheric pollution on vegetation.

Nature, 1953, 172: 659-61.

At the 1953 meeting of the British Association, Dr. Metcalfe reported experimental work at the Royal Botanic Gardens, Kew, which showed that the acute symptoms of ill-health in plants after exposure to a polluted fog are due to the presence of toxic substances in the atmosphere, especially SO_2 , rather than to the absence of light. The symptoms exhibited by many flowering glasshouse plants are briefly described. Covering the plants with paper bags, which appeared to adsorb small quantities of SO_2 , afforded considerable protection. In addition, the temperature and humidity of the atmosphere in the greenhouse should be lowered as much as the nature of the plants allows. In new towns horticultural sites should be located where atmospheric pollution is likely to be least severe.

45. MIDDLETON, J. T., KENDRICK, J. B., AND DARLEY, E. F.

Injurious smog components revealed.

Citrus Leaves, 1953, 33 (9): 34-5.

Since smog damage to plants was first reported in Southern California in 1950 [see *H.A.*, 21: 1613] annual crop losses in Los Angeles county are estimated to have exceeded \$500,000. The air pollutants responsible for silvering, bronzing and spotting on many crops were identified in 1951 as certain olefinic peroxides formed when ozone reacts with the vapours of unsaturated hydrocarbons derived from petroleum products. Controlled fumigation experiments have shown that the severity of plant injury varies with the conditions under which the crop is grown prior to fumigation. Damage to spinach was increased four-fold and to cos lettuce by

30% at 75° F. compared with 55° F. Damage to spinach was increased by 40% and to lettuce 80% when 45 lb. N was applied per acre compared with plants receiving no N. The extent of injury also varies with length of exposure to smog, age of plant and soil moisture level. Varieties of a given crop, e.g. beans, may vary widely in their susceptibility. Injury to susceptible crops is likely to be most severe when they are grown under glass. Certain weeds may be used as indicator plants in areas where susceptible crops are not grown. Injury may not always, however, be attended by visible symptoms; growth suppression has been induced in several crops including lettuce and tomato.

46. MILLER, V. L., AND OTHERS.

Lime papers and indicator plants in fluorine air pollution investigations.

J. agric. Food Chem., 1953, 1: 526-9, bibl. 7.

The problem of air contamination from effluent fluoride in Washington State has resulted in a search for inexpensive methods of detecting atmospheric fluoride. It has been found that gladiolus can, *inter alia*, be used for this purpose. The variety Ethel Cave Cole shows readily observable leaf injury from atmospheric fluoride, and after a sixteen week exposure period an injury index was determined. J.S.

Soilless and tissue culture.

(See also 79v, 80f.)

47. HEWITT, E. J.

Experimental methods for the study of micronutrient deficiencies in plants grown in sand culture.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 193-5, bibl. 5, illus.

The minimum requirements recommended for reproducible production of severe deficiency status in sand culture for each of the known plant micronutrients are summarized with respect to containers, sand, water, nutrient reagents and management.

48. RIETSEMA, J., SATINA, S., AND BLAKESLEE, A. F.

The effect of sucrose on the growth of *Datura stramonium* embryos *in vitro*.

Amer. J. Bot., 1953, 40: 538-45, bibl. 22, illus.

The sucrose requirements of *Datura stramonium* embryos *in vitro* have been studied over an incubation period of 8 days. Different stages of development require different minimal sucrose concentrations for growth: pre-heart stages, 8-12%, late heart stage, 4%, nearly mature embryos grow even without sucrose. The optimal concentration for hypocotyls is $\pm 8\%$ in pre-heart stage and decreases to 1.0-0.5% in torpedo stage. Cotyledons and hypocotyls have the same growth rate up to 5-8 mm. Thereafter hypocotyls alone continue growth. Roots develop when hypocotyls are 2.5-4 mm. long. Their optimal sucrose concentration is $\pm 2\%$. Higher concentrations than 4% decrease root formation. Different embryo stages require different osmotic values of the medium. The optimal osmotic value decreases as the embryo stage advances. If the osmotic value is kept constant, all embryo stages

respond in the same way to changes in the sucrose concentration. [Authors' summary.]

Soil management and irrigation.

(See also 67, 68, 79e, 154-164, 411, 412, 414, 543b, 654, 764, 765, 1058.)

49. BISAILLON, L.

Essai sur Ste-Clotilde (P.Q., Canada) et ses terres noires. (Ste Clotilde of Quebec and its black soils.)

Rev. d'Oka, 1953, 27: 87-106.

An interesting but highly critical account of the social and agricultural life of this small village famous for its black soils with great possibilities for excellent returns from both horticultural and staple crops, if only the findings of research could be brought to and accepted and used by the local inhabitants. The work of the Ste-Clotilde Sub-station of the Central Farm Service at Ottawa is noted with approval, but the author deplores the fact that its results are not sufficiently publicized locally. He feels that it is essential that the barrier which here would seem to prevent the use by provincials of valuable work achieved by federal experts should be broken down.

50. DELVER, P., AND STRUYS, L. C.

Het bekalkingsvraagstuk in Kennemerland.

(The problem of liming beach-bank soils in Kennemerland.) [English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1953, 16: 779-96, illus.

Some of the sandy dune soils used for market garden and bulb crops in Kennemerland are decalcified and have a pH as low as 5. Experiments were carried out over a period of 3 years to determine the effect of making heavy applications of hydrated lime (up to 17,500 lb. per acre) on the growth and yield of a number of vegetable crops, strawberries, tulips and irises. After liming, the pH fluctuated between 5 and 7.5. Most of the crops showed a very favourable response to increase in pH. In most cases only light applications were necessary to obtain optimum growth but heavy dressings were not harmful provided the lime was applied early in the season. Tulips, carrots and endive gave the highest yields on plots receiving 10,500-14,000 lb. Ca(OH)_2 per acre. Strawberries, however, yielded best on unlimed plots. It is therefore considered unwise to grow bulbs and strawberries on the same holding.

51. BROWN, C.

Plants to draw salt from the soil.

Grower, 1953, 40: 879.

Descriptions are given of *Atriplex leptocarpa* and *A. semibaccata* which are grown for their salt absorbing capacity on highly saline soils in Egypt. Both are most effective under conditions of drought. Recent initial trials in Holland are reported to be highly successful. It is suggested that these plants might be utilized in this country provided care is taken to control their spread, as the usual weedkillers are completely ineffective against the plants once they have become established. [See also H.A., 23: 3751.]

52. DAVIES, J. N.

Steam sterilization studies.

A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 63-71, bibl. 4.

High ammonia concentrations persisted for long periods in steamed soil which was left undisturbed. Where the soil was treated in accordance with normal glasshouse practice after steaming, the onset of nitrification was accelerated. Digging in a base-dressing containing stable manure resulted in increased ammonia production, which was fairly rapidly followed by the nitrification of the soil ammonia. The most rapid nitrification in the steamed soil occurred when tomatoes were planted after the soil had been base-dressed.

53. WILLIAMS, A. E.

Use of electrode boilers.

CANHAM, A. E., AND CAMERON BROWN, C. A.

To the editor.

Comm. Grower, 1953, No. 3010, pp. 434-5, illus., and No. 3012, p. 544.

Details are given of the use of electrode boilers for the steam sterilization of glasshouse soils. Compared with fuel-fired boilers they are cheap, small, easily transportable, and have 98% efficiency (compared with 70%); steam is raised much more quickly and control is automatic. Letters criticizing some of the claims made in this article, together with Dr. Williams's reply, are published in a later number.

54. LAWRENCE, W. J. C.

Soil conditioners.

A.R. John Innes hort. Instn 1952, 1953, p. 24.

An experiment was carried out using American Krilium C.R.D.189 to see whether there was an advantage in (1) using krilium as a substitute for the peat and sand used in the J.I. composts, (2) adding krilium to the J.I. composts. Flowers and tomato were used as test plants, and the results showed that the soil conditioner is no substitute for peat and sand, and of no advantage when fibrous medium loam is used for making the composts.

55. WEBSTER, G. R., AND OTHERS.

Mulches for horticultural crops.

Mimeo. Domin. exp. Stat. Saanichton 141, 1953, pp. 10, illus.

This is the third progress report on mulching from Saanichton, B.C. [For the first two reports see *H.A.*, 22: 60 and 23: 89.] *Organic mulches for boysenberries*: Sawdust mulch has given higher average yields over the period 1948-52 than hay mulch, hay incorporated or summer cultivation. In 1952, however, the hay incorporated and cultivated plots were superior. The vegetative growth was greater in the mulched plots but fruit set was poor. *Sawdust mulch for loganberries* increased yield and cane growth considerably compared with clean cultivation. *Sawdust mulch and incorporation for strawberries* appear profitable, particularly under dry land conditions. They gave higher yields in 1952 than incorporation of cut straw, compost or manure. *Hay mulch for pears* considerably increased yields and terminal growth compared with summer cultivation. *Sawdust mulch on cherries* appeared to arrest the decline of old trees. *Sawdust mulch for bulbs* greatly increased the number of large bulbs and the total number of bulbs but did not increase flower production. *Sawdust mulch for vegetables*. With spinach and early cauliflower the incorporation of 4 in. sawdust produced

the highest yields, while with carrots, tomatoes and late cauliflower a 2 in. mulch of sawdust was best. Notes are given on the use of mulches in the home garden.

56. DREZGIĆ, P.

Utica pokrivača (mulča) na zemljište i biljku. (The effect of mulching on soil and plant. [English summary 1 p.]

Zemlj. i Bilj., Belgrade, 1953, 2: 129-44, bibl. 5.

Data are presented on mulching trials in 1940, 1951 and 1952 with farm waste (chaff and farmyard manure). Both materials preserved soil moisture, reduced average soil temperatures over the whole season, and prevented sharp fluctuations in both, irrespective of climatic changes. Thus with the onset of cooler weather in the autumn soil temperatures were higher in the mulched than in the unmulched plots. Owing to the scarcity of manure, for general use chaff is recommended, to be applied in a 5 cm. layer (30 t. per ha.). Yield responses given for a number of agricultural crops show mulching to be particularly suitable for potatoes.

57. BEAN, A. G. M., AND KEMP, I.

Laying an irrigation water main.

Tech. Mem. nat. Inst. agric. Engng 83, 1953, pp. 12, illus.

Although the methods described for installing a 4 in. cast iron main and its subsidiary fittings are based on one particular installation at Wrest Park, the techniques employed are generally applicable and may prove helpful to others wishing to instal a similar overhead irrigation system. Various short cuts and precautions are mentioned. Appendices deal with frost penetration, standpipe arrangements, pump horsepower and an automatic control system for electrically-driven pumps.

58. BEAN, A. G. M., WINTER, E. J., AND WELLS, D. A.

Design of a precision plot irrigator.

Rep. nat. Inst. agric. Engng 30, [1953?], pp. 11, illus.

A description is given of a piece of equipment which will apply water to small plots, evenly and in exact amounts, thus enabling investigations to be made on the effects of different irrigation treatments. [Authors' summary.]

59. PILLSBURY, A. F.

Concrete pipe for irrigation.

Circ. Calif. agric. Ext. Serv. 418, [1953?], pp. 51, illus.

Most of the information provided in this circular is technical, describing various concrete pipe irrigation system structures and giving design and installation details. In discussing the properties of plain concrete pipe it is noted that ammonium sulphate causes deterioration of concrete and should not be added to the irrigation water before it goes through the pipe. Ammonium nitrate is considered safe, provided concentrations do not exceed 1% and the lines are flushed after application. Soil amendments, of which gypsum is the most common, may also injure concrete pipes. [A more popular, brief version of this paper was noted in *H.A.*, 22: 1192o.]

60. BEAN, G.
Overhead irrigation layout.
Fm Mech., 1953, 5: 233-5, 287-9, and 332-3, illus.

Water supply, installation, rotary sprinklers, pipe layout, delivery head, pipe friction, estimation of water h.p. and actual h.p. and sample layout are dealt with.

61. WOODING, N. H., JR., AND MYERS, E. A.
Supplemental irrigation with sprinklers.
Spec. Circ. Pa agric. Ext. Serv. 8, 1953, pp. 23, illus.

Detailed descriptions and clear illustrations are given of the equipment used in sprinkler irrigation.

62. WEBSTER, G. R., AND OTHERS.
Irrigation experiments 1952.
Mimeo. Domin. exp. Stat. Saanichton 142, 1953, pp. 9, illus.

This paper is the third in a series on sprinkler irrigation [for earlier reports see *H.A.*, 22: 1173 and 23: 100] and outlines the response of different crops, including strawberry, loganberry, raspberry, apple, cabbage, cauliflower, hyacinth, iris, tulip, daffodil, lily and gladiolus, tested during the 1952 season.

63. FOSTER, Z. C.
Evaluating salt content of irrigation water and plant tolerance.
Agric. Ext. Circ. Univ. Hawaii 338, 1953, pp. 5, bibl. 9.

Plants are roughly listed according to strong, good, medium or weak tolerance to salt in the soil solution. In explanation it is suggested that plants listed as showing weak tolerance could only stand a salt content in irrigation water of 0-675 p.p.m. or 0-40 grains per gallon, whereas strong tolerance plants might stand from 2,000 to 3,000 p.p.m. or 120-175 grains per gallon.

Glasshouses and frames.

(See also 79c.)

64. VAN KOOT, I., AND DE ZEEUW, A.
Klimatologische omstandigheden en vrucht-zetting bij gewassen onder glas. (The relationship between climatic conditions and fruit setting of glasshouse crops.) [English summary $\frac{2}{3}$ p.]
Meded. Dir. Tuinb., 1953, 16: 501-18, bibl. available, illus.

A discussion of the factors which affect flower formation, pollination and fruit set of tomatoes, peaches, plums and grapes under glasshouse conditions.

65. EHRLE, L.
Infrarotstrahler als Wärmequelle. (Infra-red radiation as a source of heat.)
Gartenwelt, 1953, 53: 183-4, illus.

Encouraging results were obtained with infra-red radiation (300-1,000 W/m²) as a source of heat for small areas in glasshouses. Dosages up to 500 W did not cause any damage to germinating seeds. This brief account mentions the successful application of the treatment to the raising of vegetable seedlings and to the forcing of bulbs and other flowers. Increases in soil temperature are recorded.—Rhein. Lehr-u. Versuchsanst. f. Gemüse-u. Obstbau, Straelen.

66. PROTASOV, A. F., AND MORYGANOV, A. N.
A trial on the electrical heating of frames. [Russian.]

Sad i Ogorod, 1953, No. 9, pp. 35-9, illus.

Notes are given on electrical heating of hot beds on a collective farm in the Moscow region, with special reference to installation and economics of operation. Among the more interesting suggestions made is one for providing the hot-bed atmosphere with supplementary carbon dioxide, produced either by placing 40 g. of dry ice under each frame or by sinking a few small containers of liquid manure in the soil.

67. ANON.
Automatic winter flooding by sprayline.
Comm. Grower, 1953, No. 3011, p. 479, illus.

A sprayline specially designed for winter flooding of glasshouses is described. It is portable and will water an area 12 ft. wide at the rate of 1 gal. per sq. ft. per hour. It can also be used for routine damping down and watering. The cost per 100 ft. length of line is £26 15s. 6d. galvanized, or £28 8s. 6d. light alloy aluminium.

68. WITTE, K.
Gewächshaus- und Frühbeetberechnung. (Sprinkler irrigation for glasshouse and hotbed.)
Gartenwelt, 1953, 53: 281-5, illus.

Data on performance and cost of operation are tabulated for various types of sprinkler.—Bonn Univ.

69. BU[SINGER, J. A.]
Bepalingen daglichtfactor van verschillende schermmaterialen en glassoorten. (Determination of the daylight factor of various shading materials and types of glass.)
Jaarversl. Inst. TuinbTech. Wageningen, 1952, pp. 18-19.

Data are presented on the light intensity, expressed in percentage of the outside light intensity, found under various types of reed mats and slatted wooden shades and under 8 types of glass. Under normal glass and perspex the light intensity was 90%, whereas under windolite it was 57% and under Thermolux only 45.4%.

70. HO[UTER, P. J.]
Vergelijking van schermmaterialen bij de teelt van stamslabonen. (A comparison of shade mats for French beans under Dutch lights.)
Invloed van afdekmaterialen op minimum temperatuur. (The influence of shade mats on the minimum temperature.)
Jaarversl. Inst. TuinbTech. Wageningen, 1952, pp. 19-20, and 20.

Temperatures were recorded at midday in Dutch lights under wooden slats of different colours with different distances between the slats. There was no effect on the growth of French beans. In the second note minimum temperatures during the night are recorded under reed, rush and slatted wooden mats.

71. WELECZKA, —.
Neue Lösung für "Zentrale Doppelkasten-Lüftung". (A new mechanism for raising lights on double-span frames.)
Gartenwelt, 1953, 53: 379-80, illus.

The apparatus described has been designed to raise the lights on a row of double-span frames by means of a winch.

Practical devices.

(See also 79b, k, q, x, 225, 230, 418-420, 468, 536, 623, 895, 970, 1007.)

72. HOFFEN, H. J., AND BIESLSKI, E.
Small farm implements.
FAO Develop. Pap. 32, 1953, pp. 79, bibl.
pp. 6½, illus., 3s. 9d.

The purpose of this publication is to spread the knowledge of better implements and to provide information on the principles governing their design. Descriptions, supported by 120 figures, are given of small implements used in many parts of the world, and suggestions are made for their improvement.

73. BUCHHOLZ, W.
Drei Jahre Terrex. (Three years of the Terrex spade.)
Gartenwelt, 1953, 53: 281-2, illus.

The advantages of this officially recommended, patented spade are discussed. By rendering the work of digging less arduous it claims to increase performance by at least 35%.

74. SCH., F.
Ein Umpflanzapparat für den Gartenbau. (A horticultural transplanting tool.)
Tech. Bauern Gärt. Ausg. G., 1953, 5: 84-5, illus.

The tool described looks like a cross between secateurs and tongs. Its main part is a tube that opens to embrace a ball of soil around the seedling roots. It is claimed that seedlings lifted in this manner and released in the hole make better growth than hand-transplanted seedlings.

75. HO[UTER, P. J.]
De toepassing van turfkwiekpotten. (The use of peat pots for propagation.)
Jaarversl. Inst. TuinbTech. Wageningen, 1952, pp. 21-3.

Peat pots are compared with normal clay pots for raising French beans and melons. The bigger the pots the better was the development of the plants. Soil in clay pots was usually drier than that in the peat pots, but there was little difference in final yield of the crops. It was found beneficial to water the peat pots with a fertilizer solution before use. They did not completely disintegrate in the soil.

76. VICTOR, B.
Technische Betrachtungen zur Erd- und Kompostaufbereitung. (Machines for compost preparation.)
Gartenwelt, 1953, 53: 285-7, illus.

The time needed for the rotting of compost material can, under favourable conditions, be reduced to 3 months, if it is finely shredded and mixed with peat, soil, lime, fertilizers, etc. Machines performing these operations are described and illustrated.

77. ANON.
Multi-crop cheap grading machine.
Comm. Grower, 1953, No. 3010, p. 439, illus.

An account is given of a new grading machine for apples, tomatoes and soft fruits. It has given a throughput of 8½ tons of apples or 3½ tons of tomatoes over 8 hours of testing. The unit is fitted with an automatic cull eliminator. The machine may be hand operated (price £57) or motor operated (price £67 10s.).

78. BOEKE, J. E.
Vijf jaren onderzoek over "fruit-coating" in Nederland. (Five years experimental work on coating of horticultural produce in Holland.) [English summary ½ p.]
Meded. Dir. Tuinb., 1953, 16: 693-706, bibl. 23, illus.

Extensive trials are reported from Holland on the coating of fruits, vegetables, cut flowers and planting stock with emulsions of oils or waxes, certain commercial emulsions, melted waxes or colloidal solutions of carboxymethylcellulose. The general conclusions reached were as follows. (1) Coating may improve the keeping quality of stored produce by decreasing water loss and retarding ripening, rotting and the development of scald and Jonathan spot; it may also improve appearance. (2) The results were not sufficiently consistent to allow the practice to be recommended for commercial use. In many cases coating had detrimental effects. (3) The effect of a coating seemed to depend both on the properties of the coating and on the produce treated. (4) An ideal coating should prevent wilting without having any appreciable effect on respiration or other metabolic processes; such a coating is not yet available. The advantages and disadvantages of different techniques of application are discussed.—Inst. voor Bewaring en Verwerking van Tuinbouwproducten, Wageningen.

Noted.

79.
a AKENHEAD, D.
Exchange of ideas on horticulture.
Times agric. Rev., Autumn 1953, p. 15.
An account of the Commonwealth Bureau of Horticulture and Plantation Crops and its functions.
b ANON.
Neue Kleingeräte für Baumschulen. (New small machines for the nursery.)
Tech. Bauern Gärt. Ausg. G., 1953, 5: 57, illus.
For fertilizer application, hoeing and making holes for planting.
c ANON.
Unit heaters as replacements for pipe coils in greenhouses.
Amer. Nurseries, 1953, 98 (8): 10, 83, illus.
For space heating.
d BENTLEY, J. A., AND HOUSLEY, S.
Growth of *Avena* coleoptile sections in solutions of 3-indolylacetic acid and 3-indolylacetoneitrile.
Physiol. Plant., 1953, 6: 400-4, bibl. 5.

- e BLONDIN, P.
La stérilisation du sol. (Soil sterilization [by heat].)
Compte rendu de la démonstration d'appareils à stériliser. (Report on the demonstration of soil sterilizing equipment.)
Rev. hort. Suisse, 1953, 56: 298-9 and 300-2, illus.
At l'École d'Horticulture de Châtelaine.
- f BÜNSOW, R.
Über den Einfluss der Lichtmenge auf die endogene Tagesrhythmik bei *Kalanchoë Blossfeldiana*. (On the influence of amount of light on the endogenous daily rhythm in *Kalanchoë blossfeldiana*.)
Biol. Zbl., 1953, 72: 465-77, bibl. 14.
- g CHAKRABORTTY, H. C., AND BURMA, D. P.
Investigations on circular paper chromatography.
Curr. Sci., 1953, 22: 238-9, bibl. 5.
At Bose Res. Inst., Calcutta.
- h DOORENBOS, J.
Review of the literature on dormancy in buds of woody plants.
Meded. LandbHooges. Wageningen, 1953, 53: 1-24, bibl. pp. 8.
- i FELDMEIER, I., AND V. GUTTENBERG, H.
Über das Vorkommen von Wuchs- und Hemmstoffen in Samen und Keimpflanzen von *Phaseolus vulgaris*. (On the occurrence of growth promoting and growth inhibiting substances in seeds and seedlings of *Phaseolus vulgaris*.)
Planta, 1953, 42: 1-18, bibl. 29.
- j GEORLETTE, R.
Résultats des plus récentes recherches sur l'action de l'élément sodium et des éléments mineurs contenus dans le nitrate du Chili. (Results of recent research on the action of sodium and of the minor elements present in Chilean nitrate.)
Ann. Gembl., 1953, 59: 73-126, bibl. 370.
- k GERMEK, E.
Emprêgo de laminado plástico vinílico como amarrilho na enxertia. (Use of vinyl plastic strips for tying in grafting.)
Bragantia, 1951, 11: 267.
- l GLOYNE, R. W.
Radiation minimum temperature over a grass surface and over a bare-soil surface.
Met. Mag., 1953, 82: 263-7, bibl. 10.
- m GREGORY, F. G.
The control of flowering by daylength and temperature. Parts I and II.
J. roy. hort. Soc., 1953, 78: 313-23, bibl. 14, and 362-73, bibl. 15, illus.
A review.
- n V. GUTTENBERG, H., EIFLER, I., AND NEHRING, G.
Die Wuchsstoffe von *Coleus*, *Cucumis* und *Helianthus*. (Growth substances in *Coleus*, *Cucumis* and *Helianthus*.)
Planta, 1953, 42: 209-19, bibl. 8.
- o HEALEY, A. G.
Training for modern horticulture.
Agriculture, Lond., 1953, 60: 226-9.
At the Essex Institute of Agriculture, Writtle, and similar institutes.
- p IMPERIAL CHEMICAL INDUSTRIES LTD.
Jealott's Hill Research Station.
Imperial Chemical Industries Ltd., Bracknell, Berks., 1953 [?], pp. 16, illus.
- q KENNELLY, A. G., AND GILLARD, S. O.
Construction and use of frames and lights in the home garden.
N.Z. J. Agric., 1953, 87: 65-71, illus.
With diagrams.
- r KENT, M. J.
An improved holder for seedlings in the *Avena* test.
Science, 1953, 118: 214-15, bibl. 1, illus.
- s KUIPER, N. H., AND CORSTEN, L. C. A.
Open plaatsen in variantieschema's. (Missing plots in experimental designs.) [English summary 1 line.]
Meded. LandbHooges. Wageningen, 1953, 53: 25-30, bibl. 8.
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Role of copper in crop production.
Trop. Agriculture Trin., 1953, 30: 76-82, bibl. 64.
A review.
- u MARAIS, P. G.
High voltage supply for Geiger-Muller counters.
Sci. Bull. Dep. Agric. S. Afr. 335, 1952, being *W. Prov. Fruit Res. tech. Ser.* 33, pp. 8, bibl. 1, illus.
- v VAN DEN MUIJZENBERG, E. W. B., AND OTHERS.
Kastypen en plantenteelt zonder aarde in België. (Types of glasshouses and soilless culture in Belgium.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1953, 16: 817-26, bibl. 9, illus.
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- w PIJLS, F. W. G.
Bodemkundige verschillen tussen Oost- en West-Nederland en de tuinbouw. (Differences in soil conditions in the East and West of the Netherlands in relation to horticulture.) [English summary $\frac{3}{4}$ p.]
Meded. Dir. Tuinb., 1953, 16: 654-66, bibl. 6, illus.
- x POWELL, A. A.
Humidification system for propagating houses.
N.Z. J. Agric., 1953, 87: 29, illus.
Notes on fittings and costs.
- y SIDDAPPA, G. S., AND BHATIA, B. S.
A simple device to keep cylinders of paper inside glass cylinders for paper chromatography.
Curr. Sci., 1953, 22: 239.
Centr. Food Res. Inst., Mysore.

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Étude hygrophotographique de la transpiration des plantes. (A hygrophotographic study of transpiration in plants.)
C.R. Acad. Sci. Paris, 1951, 232: 1956-8, bibl. 3, illus.
Recherches sur la transpiration des plantes par la méthode hygrophotographique. (Studies of plant transpiration by the hygrophotographic method.)
Bull. Soc. bot. France, 1952, 99: 138-41, bibl. 7, illus.
The experimental plants included lilac.
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- a SIVADJIAN, J.
Sur l'enregistrement hygrophotographique des précipitations atmosphériques. (On the hygrophotographic recording of atmospheric precipitation.)
C.R. Acad. Sci. Paris, 1952, 234: 647-8, bibl. 2, illus.
- b SØRENSEN, H.
Symbiotisk kvælstofbinding hos ikke-bælgplanter. (Symbiotic nitrogen assimilation in non-leguminous plants.)
Nat. Verd. Kbh., 1953, 37: 63-74, bibl. 20, illus.
Including *Myrica*, *Elaeagnus*, *Hippophaë*, *Shepherdia*, *Coriaria*, *Ceanothus*.
- c STREET, H. E.
Factors controlling meristematic activity in excised roots. III. Light as a factor in the "location effect" noted with roots of *Lycopersicum esculentum* Mill.
Physiol. Plant., 1953, 6: 466-79, bibl. 7, illus.
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On the composition of the soluble nitrogen fraction in the pea plant and alder.
Biochem. biophys. Acta, 1953, 12: 181-7, bibl. 26, illus.
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Some chemical aspects of the mineral nutrition of plants.
Reprinted from *J. Inst. Chem. Ireland*, 1951/52, pp. 27-39, bibl. 24, illus.
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- f WHITE, P. R.
A comparison of certain procedures for the maintenance of plant tissue cultures.
Amer. J. Bot., 1953, 40: 517-24, bibl. 25.
Using carrot tissues.
- g WICHERS, A. J.
Intern vervoer op veilingen. (Internal transport at auctions.) [English summary ½ p.]
Meded. Dir. Tuinb., 1953, 16: 638-48, bibl. 4, illus.
By barge and by truck in fruit and vegetable markets in Holland.
- h WILCOX, J. B., KNIGHT, J. R., AND BLESS, A. A.
Bioelectric potentials of tumor-infected plants.
Plant Physiol., 1953, 28: 545-9, bibl. 7.
Experiments with tomato inoculated with *Pseudomonas tumefaciens*.
- i WILLIAMS, K. T., AND BEVENUE, A.
Qualitative paper chromatography of sugars in plants. Technique and reagents.
J. Ass. off. agric. Chem. Wash., 1953, 36: 969-79, bibl. 33.
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A linear recording AC conductance bridge for measuring salt exchange in plants.
Physiol. Plant., 1953, 6: 444-50, bibl. 2, illus.
- k DE ZEEUW, D.
De invloed van groeistof en antigroeistof op de bloei van hogere planten. (The influence of growth-promoting and growth-inhibiting substances on the flowering of higher plants.)
Reprinted from *Vakblad v. Biologen*, 1953, 33: 165-76, bibl. 57.
A review.

TREE FRUITS, DECIDUOUS.

General.

(See also 1, 2, 5, 6, 8, 201f, h, i, k, l, o, r, u, x, 1019, 1028, 1032, 1038, 1039, 1043, 1046-1049, 1053, 1059, 1061c.)

81. DEPARTMENT OF AGRICULTURE, VICTORIA.
Horticultural Research Station, Tatura, Guide book 1953, pp. 18.

The Tatura Station serves one of the largest fruit-growing areas in Australia. The Goulburn Valley produces some two-thirds of the Australian output of canned peaches, four-fifths of the canned pears, and nearly half the canned apricots. An account is given of its chief current activities. They are directed particularly to soil management and irrigation of peaches, fertilizers for peaches, peach varieties, pruning and thinning peaches for canning. Pear investigations cover soil management and rootstock problems, while the

main problems listed under apricots concern varietal improvement, rootstocks and black heart disease.

82. SCHLOTZHAUER, E. O., AND FROST, O. M.
Fruits (noncitrus) production, farm disposition, value, and utilization of sales, 1944-1949. Revised estimates.
Statist. Bull. U.S. Dep. Agric. 114, 1952, pp. 45.

Amounts and values are tabulated for all major top fruits as well as for cranberries, dates, figs, grapes, persimmons, pineapples and pomegranates. Their marketing seasons are noted.

83. FAURE, J.
La production fruitière sur le plan international. (Fruit production on the international level.)
Fruits d'Outre Mer, 1953, 8: 337-42.

World production and consumption are discussed and statistics are given for world production of important fruits from 1948 to 1952 and for total and citrus consumption in various countries in 1951. The author considers that in France and elsewhere fruit production at present exceeds consumption but that it is difficult to say whether this situation is due to an excess of fruit or to shortage of consumers. His 3 suggested policies to ensure equilibrium between supply and demand are: (1) technical, which includes improved quality, range of choice, good stocks and storage and wise import policies; (2) economic, including the maximum reduction in production costs and also in handling charges which in France and many other countries are unduly high; and (3) psychological, such as propaganda.

84. ROLIN, P.

Le prix de revient en arboriculture fruitière.

(Costs in fruit growing.) [English summary ½ p.]

Rev. Agric. Brux., 1953, 6: 1372-97.

Cost assessment of an orchard should be based on (1) a calculation of the cost per kg. of fruit throughout the life of the orchard, taking into consideration the economics of the different methods of training, and (2) a study of the individual items of expenditure in one or more years with a view to making economies. Notes with practical examples are given on the calculation of costs.

85. VAN STUYVENBERG, J. H.

Verschillen in de rentabiliteit van fruit-bedrijven. (Differences in returns from fruit farms.) [English summary ½ p.]

Meded. Dir. Tuinb., 1953, 16: 616-26.

Data taken from costings of fruit farms carried out by the Agricultural Economics Research Institute in the Netherlands are used as a basis for this discussion on the differences in the returns from fruit farms and the reasons for these differences.

86. WILLMOTT, P. K., AND RICHARDSON, P.

Top fruit trials north of the Trent.

Grower Annual Fruit Suppl., Autumn 1953, pp. 10-13.

A brief survey of the position of top fruit growing in Yorkshire and the results of small-scale apple variety trials at Askham Bryan lead to the following conclusions: (1) It is possible to grow good fruit of only slightly lower quality and appearance than that grown in the south of England. (2) Research in manuring and management might improve quality. (3) Varieties which colour well and are not predisposed to cracking are likely to give the best results. (4) As the markets of industrial towns are already well supplied there will be no great incentive for Yorkshire growers to plant fruit in any quantity.

87. MORETTINI, A.

I problemi della frutticoltura italiana.

(Problems of Italian fruit growing.)

Humus, 1953, 9 (6/7): 3-6.

Average annual fruit production in Italy increased by 30% and exports rose from 7 to 7½ million quintals between 1932-36 and 1951-52. Only by improving cultural and commercial techniques, expanding industrial development (pulp, preserves, juices, canned and dried products) and increasing internal consumption

(which is low) can the present position be maintained or improved. Recommendations are made regarding the establishment of new, and the maintenance of existing, orchards.

88. NOVEL, P.

Une plantation d'abricotiers en aridoculture au Maroc. (A dry-culture apricot orchard in Morocco.)

Fruits d'Outre Mer, 1953, 8: 273-6, illus.

Notes are given on a successful unirrigated apricot orchard in a semi-desert part of Morocco with a poorly distributed rainfall of only 200 mm. The orchard is situated on a gentle, even slope. Each tree is planted in the angle of a V-shaped basin bounded by an earth ridge. The legs of the V run uphill and act as water collectors, while the wall at the down hill point reaches 50-70 cm. in height. The hollow of the basin round the tree is either hoed or sown to a cover crop, generally barley. It is estimated that the effect of the V is to provide the apricots with the equivalent of 600-800 mm. of rainfall per annum.

89. BALDINI, E.

Alcuni aspetti della coltura del fico nella provincia di Firenze. (Some aspects of fig growing in the province of Florence.) [English summary 6 lines.]

Riv. Ortoflorofruttic. ital., 1953, 37: 185-203, bibl. 16, illus.

Notes are given on the principal varieties, propagation, training and pruning, manuring, harvesting, pests (*Ceroplastes rusci*, *Simaethis nemorana*, *Hypoborus ficus*, *Synoxylon* sp.) and diseases (*Phyllosticta syco-phila*, *Phomopsis cinerescens*) and their control.

Breeding and varieties.

(See also 10, 201a, b, d, j, p, q, 1037, 1041, 1044, 1048.)

90. TJAŽELJNIKOV, A. D.

Breeding large fruited apple varieties for Siberia. [Russian.]

Agrobiologija, 1951, No. 3, pp. 62-8, bibl. 5, illus.

A description is given of a method of producing large-fruited hardy apples by fundamentally changing environmental conditions during the early life of the hybrids raised. The seedlings were grown at Novosibirsk on light soil up to the time of flower bud differentiation, to acquire hardiness, and were then transferred to Samarkand to develop large fruits in a warm climate and good soil. Scions taken from the most promising trees were sent back to Siberia to be worked on local rootstocks. Not only fruit size but also the quality of the hybrids conditioned in the south was improved, chemical analyses showing reduced acidity and increased dry matter, sugar and vitamin C content.

91. LISAVENKO, M. A.

A vegetative hybrid of Mičurin's apple varieties. [Russian.]

Agrobiologija, 1951, No. 2, pp. 117-20, illus.

At the Altai Fruit Experimental Station the apple variety Slavjanka grafted on the variety Pepin Safran-nyĭ produced a yellow pink-striped fruit weighing 70 g. containing 5 seeds. The graft hybrid is morphologically different from its original varieties and is expected to be hardier.

92. ŠAĬTAN, I. M.

The effect of conditions of development on results of crosses between fruit trees. [Russian.]

Atrobiologija, 1951, No. 2, pp. 122-3.

Observations over 3 years have shown a variation in the setting and maturation of the fruit of individual Siberian crab trees pollinated with pear pollen.

93. MILEŠKO, A. J.

Breeding pears under southern conditions. [Russian.]

Agrobiologija, 1951, No. 3, pp. 82-8, bibl. 3, illus.

Results obtained in the Crimea with crosses made between local and European pear varieties are reported.

94. KARANJAN, P. G.

Breeding pears for the mountainous zone of Armenia. [Russian.]

Agrobiologija, 1951, No. 3, pp. 89-93, bibl. 2, illus.

Three newly developed varieties, suitable for the severe climate in the mountains, and methods by which they were obtained are described.

95. POTTER, J. M. S.

Recent developments in fruit culture at Wisley.

J. roy. hort. Soc., 1953, 78: 408-13, illus.

The lay-out is described of the new apple and plum variety plantings on recently acquired land adjoining Wisley Gardens.

96. VEIGA, A. A.

Produção de cidra de maça. (Cider making [in Brazil].) [English summary 8 lines.]

Bragantia, 1952, 12: 55-8, bibl. 3.

Preliminary experiments showed that the Ohio Beauty apple grown at Valinhos in São Paulo State is suitable for cider making.

97. BURGHER, A. T.

Pears, plums and peaches.

Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 24-7.

Pear and plum varieties suitable for western Nova Scotia are indicated. Even though peaches are not recommended for commercial planting, there is a considerable interest in them and suitable varieties are listed.

98. ROULON, —.

À l'occasion du Congrès National Pomologique de Rennes. (At the Rennes National Pomological Congress.)

Pomol. franç., 1953, 80: 107-9, illus.

Notes are given on Reinette d'Armorique, a recently introduced French dessert apple which is in season from March to May. It has already got a good market and sells particularly well in Brittany.

99. NATIVIDADE, J. V., AND COELHO, J. M. N. S.

Melhoramento da flora fruteira portuguesa. I. Novas variedades culturais de pessegueiro. (Improvement of Portuguese fruit varieties. I. New peaches.)

Agron. lusit., 1953, 15: 39-65, bibl. 25, illus.

Descriptions are given of 12 new peach varieties bred

at the National Agronomic Station and now ready for release. They are mainly derived from the early Triumph, the midseason J. H. Hale, the midseason-late Frei Bernardo de Brito and the late de Alcobaça, and their combined seasons cover the period 4 July to 10 September.

100. MORETTINI, A.

Nuovi peschi Morettini: La Precocissima e La Gialla di Firenze. (New Morettini peaches: La Precocissima and La Gialla di Firenze.) [English summary 7 lines.]

Ital. agric., 1953, 90: 631-43, bibl. 8, illus., and *Riv. Ortoflorofruttic. ital.*, 1953, 37: 375-87, bibl. 8, illus.

The author first lists the principal characters of a dozen peach varieties bred by him in Florence during the last 20 years and described in earlier papers, and then gives notes on 2 new varieties.

101. DERMINE, E., AND LIARD, O.

Identification et description des variétés du prunier européen. (Identification and description of the varieties of European plum.) [English summary 8 lines.]

Rev. Agric. Brux., 1953, 6: 1203-55, bibl. 12, illus.

The object of the study described was to find diagnostic characters for identifying European plum varieties. To this end varieties and subtypes grown in Belgium and abroad were subjected to close examination and comparison as regards habit, dormant shoots, flower buds, young leaves during flowering, flowers, adult leaves, fruits and stones. In general the absolute dimensions of an organ vary too widely to be of much value, but the relationships between 2 dimensions are much more stable. The most useful differences between the flowers, fruits and stones in the various varieties lie in the presence or absence of certain characters or the shape of certain organs. Thanks to these characters, which are numerous, dichotomous keys affording rapid identification of varieties can be prepared. Flowers and stones have many suitable diagnostic characters but fruits rarely present such characters.

102. DONNO, G.

Il *Prunus dasycarpa* Ehrh. (*Prunus dasycarpa*.)

Ann. Fac. Agrar. Portici, 1950/1951 [issued 1952], 19: 32-48, bibl. 25, illus.

A botanical description of *Prunus dasycarpa* with short notes on flowering and yield and on cultivation in the Vesuvius district.

103. DONNO, G.

La determinazione di alcune varietà di fico della Provincia di Lecce nel periodo invernale. (The identification of some fig varieties in the province of Lecce in winter.)

Alcune varietà bifere di fico coltivate in Provincia di Lecce. (Some two-crop varieties of fig grown in the province of Lecce.)

Alcune varietà unifere di fico coltivate in Provincia di Lecce. (Some one-crop varieties of fig grown in the province of Lecce.)

Ann. Fac. Agrar. Portici, 1950/1951 [issued 1952], 19: 49-54, 89-106, 167-95, illus.

The first paper, which is illustrated, contains a key to

17 fig varieties based on the characters of the terminal bud, shoot, node, internode and stipule. The second and third papers (not illustrated) give notes on the morphology, biology, cultural requirements and uses of 6 two-crop and 10 one-crop varieties. In general the two-crop varieties are more suitable for dessert than for drying. Of the one-crop varieties some are more suitable for dessert and some for drying.

104. DONNO, G.

Primo contributo alla conoscenza del biferismo del fico. (A first contribution to knowledge on double-cropping in the fig.) Constatazioni e considerazioni sul biferismo del fico. (Facts and conclusions regarding double-cropping in the fig.)

Ann. Fac. Agrar. Portici, 1950/1951 [issued 1952], 19: 107-14, 214-23.

A study of fruit bud development in relation to spring growth in two-crop and one-crop varieties of fig in the province of Lecce showed that (1) fruit buds began development in February but not simultaneously or in any particular order in relation to their position; (2) fruit buds of two-crop varieties began development much earlier than those of one-crop varieties; (3) the flower buds of two-crop varieties were much larger when spring growth began than were those of one-crop varieties; (4) in both groups spring growth was early, medium or late according to variety; (5) in two-crop varieties the rates of shooting and fruit bud growth were equivalent, the earliest varieties having the largest buds and the latest the smallest; (6) in one-crop varieties the rate of shooting was not proportional to that of prefoliar development of the fruit buds, one midseason variety, for example, having larger fruit buds than an early variety; (7) in two-crop varieties the rate of shooting was not equivalent to that of maturing of first crop figs, one late variety, for example, maturing its flowers before others; (8) dropping of syconia or small fruits in one-crop varieties began soon after the spring growth flush; (9) the interval between the initiation of spring growth in early and in late varieties was 18 days in the two-crop group and 22 in the one-crop group; (10) the duration of the growth flush was 10-17 days in two-crop and 9-20 days in one-crop varieties and was shorter in late varieties in both groups. The conclusions drawn in the second paper are that (1) there are one-, two- and three-crop varieties of fig; (2) the yield of the first crop in two-crop varieties varies according to variety and can sometimes greatly exceed that of the second crop; (3) some two-crop varieties do not bring the first crop to maturity owing to early natural abortion and others only mature a small quantity very occasionally owing to fruit drop; (4) the chief causes of immature first-crop fruit drop are bad weather and competition between shoots and fruits; (5) soil, climate, plant health and cultural practices have a considerable effect on total yield, in both first- and second-crop figs; (6) in general in a given plant, the yields of first- and second-crop figs are in inverse ratio; (7) the first crop can be increased by limiting or preventing caprification, by correct manuring and soil cultivation, and by stimulating its prefoliar growth and the spring flush by the application of unfermented organic matter near the roots; and (8) the second crop can be increased by early artificial

elimination of the first crop and by repeated and complete caprification.

Propagation and rootstocks.

(See also 78, 79k, 201n, 704.)

105. KRÜSSMANN, G.

Die Entwicklung der Baumschulen in den wichtigsten Gartenbau-Ländern. (Nursery statistics of the more important horticultural countries.)

Dtsch. Baumsch., 1953, 5: 269-80, bibl. 20.

Deals with 12 European countries and the United States. International and national associations are also listed.

106. REISAETER, O.

Über die Baumschulen in Norwegen. (Nurseries in Norway.)

Dtsch. Baumsch., 1953, 5: 293-6, illus.

A brief account of Norwegian nurseries by the chief nurseryman of the Agricultural College of Norway.

107. MAURER, K. J.

Über einige Provenienzen des Apfelsaatgutes für die Unterlagenzucht. (Sources of apple seed for the raising of rootstocks.)

Saatgut-Wirtsch., 1953, 5: 252-6, bibl. numerous.

This compilation includes many references to Polish, Russian, German, American and English literature. [It shows signs of haste.]

108. KOŠELENKO, V. M.

Stratification of stone fruit seeds. [Russian.]

Sad i Ogorod, 1953, No. 9, pp. 12-14, illus.

Seed of cherry, sloe and cherry-plum stratified soon after harvest, and if necessary cold stored after stratification, germinated better than seed stratified later (October-November). Of the materials used for stratification moss was found most suitable and was easier to handle than peat or sand.

109. ZDRUJKOVSKAJA, A. I.

Raising seed embryos of early cherry varieties. [Russian.]

Agrobiologija, 1951, No. 1, pp. 177-9, illus.

In early maturing fruit (cherries and peaches), for reasons yet unknown, the seed embryo dies during ripening. Trials conducted at the Nikitski Botanic Gardens with 2 early cherry varieties have shown that seed collected 25-28 days after pollination, i.e. 10-12 days before full maturity, can be successfully germinated and the plantlets grown in aseptic culture. Using the method here outlined, about 30% of the seed produced plants suitable for planting out.

110. SCARAMUZZI, F.

Osservazioni su un nuovo tipo di innesto "ad intarsio". L'innesto a triangolo modificato. (Notes on a new method of cleft grafting, the modified triangular method.) [English summary 4 lines.]

Riv. Ortoflorofruttic. ital., 1953, 37: 388-401, bibl. 11, illus.

The modified triangular method is employed in the nursery propagation of apple, pear, peach, cherry, plum and persimmon and is useful for reworking stocks on which dormant budding has previously failed and for working full-grown trees. The base of

the scion is cut to a wedge shape and fits into a cleft in the side of the topped stock. No binding is required. Advantages claimed for the method are good union, quick growth and low cost.

111. HOBBS, E. W., AND CAMPBELL, A. I.
A nursery method designed to reduce the attacks of bacterial canker on the stems and crotches of young plum trees.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 37-40, bibl. 1, illus.

In the course of an investigation into varietal susceptibility to bacterial canker, a method of high working, involving the insertion of 4 or 5 buds on laterals of Myrobalan B rootstock, was developed, which avoided all pruning or other knife cuts during the winter months when the spread of canker is most active. The method is described in detail, and the first year's growth of 4 varieties worked in this way compared with that made by low-worked trees. The high-worked trees had stouter stems, but there were no consistent differences in branch spread.

112. PUTOV, V. S.
Our trial on plum propagation. [Russian.]
Sad i Ogorod, 1953, No. 9, pp. 21-4, illus.

At the Ćemaljsk substation of the Altai Zonal Experimental Station trials have been conducted for a number of years on the propagation of plums and plum-cherry hybrids, the two most popular stone fruits in Siberia. Budding gave a very low percentage of take, but bench grafting in early spring was found very satisfactory and is now generally recommended. Sand cherry [*Prunus pumila*] seedlings used for rootstocks were found compatible with all the plum varieties tested.

113. TARASENKO, M. P.
The reciprocal influence of rootstock and scion in fruit trees. [Russian.]
Agrobiologija, 1951, No. 1, pp. 45-54, bibl. 8, illus.

Rootstocks grown from seeds of early fruiting mother plants are found to be more hardy than those grown from seeds of late maturing plants, because with the former the vegetation period is shorter and the wood ripens more thoroughly before the winter. Similar observations were made on scion varieties and a reciprocal rootstock-scion influence was noted. Thus varieties grafted on hardy rootstocks were more frost resistant and conversely hardy varieties improved the frost resistance of the root-system of rootstocks. The experimental evidence relates mainly to apples, and shows Kitaika [Chinese crab] to be a more suitable rootstock for the Ukraine than the wild apple. Other problems discussed include incompatibility observed in some rootstock-scion combinations, production of a hardy framework by top-working young seedlings, and premature flowering.

114. THOMAS, L. A.
Stock and scion investigations. IX. Twelve years of rootstock effect in an apple orchard trial.
J. hort. Sci., 1953, 28: 229-37, bibl. 5.

The origin of these trials at Stanthorpe, Qd, was described in a paper by Dickson and Thomas in *J. Coun. sci. ind. Res. Aust.*, 11: 169-74; *H.A.*, 9: 47. Now in 1951, 12 years after planting apple trees on

clonal and seedling stocks, the largest and heaviest cropping trees were found to be Jonathan on Malling XII rootstocks. With Granny Smith as scion, the largest trees were on XII, but the heaviest crops were from trees on II and those on Northern Spy. Trees varied more in size on Pomme de Neige × French Crab seedlings than on clonal stocks. The average weight of individual fruits showed little variation with different stocks.

115. LONGLEY, R. P.
Apple rootstock tests.
Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 15-16.

In an orchard, planted in 1934, containing McIntosh and Fameuse varieties on 4 Malling rootstocks (I, II, IX and XII) and 2 seedling rootstocks, Anis and Beautiful Arcade, it was found that all Fameuse and practically all McIntosh trees on M. IX had scion rooted and were not included in these observations. The trees became biennial bearers and in the development of the biennial habit no significant differences were found between rootstocks. Trees of both varieties were largest on M. XII and smallest on M. II. The M. XII trees were slower in coming into bearing than the others, but the Fameuse trees on M. XII became the highest producers and McIntosh on M. XII were about average. Those on M. II were smallest in size and lowest in yield. The McIntosh trees on Beautiful Arcade far outyielded those on the other rootstocks, and Fameuse trees on this rootstock were only slightly below the leading M. XII trees. It was noticeable that the very vigorous M. XII trees produced fruit with less colour than the others; differences in fruit size were insignificant.

116. CAWTHRON INSTITUTE.
Apple stock experiments at Annesbrook orchard.
A.R. Cawthron Inst., 1952/53, p. 21.

Double Vigour (French crab vegetatively propagated) continued to be superior to Northern Spy as rootstock for the variety Statesman both in tree growth and fruit yield. Vegetatively propagated rootstocks derived from Epp's Seedling also continued to give better growth and higher yields of both Cox's Orange and Jonathan varieties than Northern Spy rootstock.

117. DE WET, A. F.
Apple rootstock problem.
Fmg S. Afr., 1953, 28: 265-8, 272, bibl. 4, illus.

Existing methods of raising apple trees in South Africa on vegetatively propagated Northern Spy or seedling rootstocks are described and the advantages and disadvantages of these rootstocks are enumerated. Preliminary results of trials with new stocks suggest Merton 793 to be particularly promising and its use for planting on a limited scale is recommended.

118. JOHANSSON, E.
Sort-och grundstamförsök med äpple vid Alnarp 1937-52. Redogörelse för perioden 1946-52. (Apple varieties and rootstock trials at Alnarp 1937-52. Report for the period 1946-52.) [English and Esperanto summaries pp. 1 $\frac{1}{4}$ and $\frac{1}{2}$ p. respectively.]
Medd. Trädgårdsförs. Malmö 83, 1953, pp. 12, bibl. 3.

For the first report on this trial covering the period up to 1945 see *H.A.*, 17: 1168. The following are the main results obtained in the second phase: (1) the 6 varieties tested developed into large trees when worked on M. XII, XIII, XVI or A3. Transparente Blanche, James Grieve and eventually also Cox's Orange made poor growth on M. I. (2) Cox's Orange, James Grieve and Transparente Blanche yielded better on XVI than on IV. Yields of Gravenstein on I, II and XVI averaged 39 kg. and on A3 47 kg. per tree per year. James Grieve did best on XVI (56.3 kg.) and A3 (56 kg.) and Transparente Blanche on XII (37.5 kg.). (3) The average fruit weight of Gravenstein was largest on IX (102 g.); with most varieties fruit size was smallest on I. (4) Fruits of all varieties developed better colour and matured earlier on IX and IV than on the other rootstocks. (5) Vigorous rootstocks are recommended for Cox's Orange and James Grieve, though IV may be used where early fruiting is desired. Vigorous varieties were found to yield best on IV, but II or I may be preferred where anchorage is an important point.

119. PRESTON, A. P.

Improved rootstocks for apples.

Amer. Fruit Gr., 1953, 73 (10): 10, 14.

A short account is given of the raising and characters of the new rootstocks known as the Malling-Merton [MM] stocks bred jointly by the staffs of the John Innes Horticultural Institution and the East Malling Research Station, England, the aim being rootstocks which will give moderate sized trees and are resistant to woolly aphis. Notes are given on MM 115, 111, 104 and 106, and [Malling] M. XXV. [See also *H.A.*, 23: 162 and 2554.]

120. BRASE, K. D.

Similarity of the Clark Dwarf and East Malling rootstock VIII.

Proc. Amer. Soc. hort. Sci., 1953, 61: 95-8, bibl. 3, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* 909.

Clark Dwarf cannot be distinguished morphologically from the rootstock EM. VIII and is believed to be identical with it. J.S.

121. CLARKE, W. S., Jr.

The nursery performance of apomictic crabapple seedlings.

Fruit Var. hort. Dig., 1953, 8 (2): 25-6.

An experiment was started in 1950 at the Pennsylvania State College to determine the suitability of some apomictic apple species as rootstocks. Details are tabulated and briefly discussed of the performance of first year seedlings of apomictic apple species in comparison with some commercial varieties, and the percentage of successful grafts of 3 varieties worked on the seedlings is recorded.

122. LONGLEY, R. P.

Apple tree stembuilding.

Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 19-21, illus.

Experiments are described indicating that while a Virginia Crab stem-piece had a dwarfing effect and caused early bearing, later development has been definitely undesirable in the case of Spy, Cortland and Starking Delicious varieties. Golden Delicious and Wagener showed no noticeable ill effects. The Haas

variety used as an intermediate stem-piece produced undesirable, narrow crotches. Trees with Hibernal stem-pieces were, on the average, the largest, gave good yields, and appeared the most promising.

123. BALDINI, E.

Ricerche sulla disaffinità d'innesto del pero "Imperatore Alessandro" ("Kaiser") su cotogna. (Research on stock-scion incompatibility between quince and Imperatore Alessandro pear.) [English summary 9 lines.] *Riv. Ortoflorofruttic. ital.*, 1953, 37: 402-11, bibl. 15, illus.

Investigations showed that the incompatibility is not anatomical since union occurs normally, but that it may be due to physiological factors. If it is desired to use a quince rootstock Imperatore Alessandro can be double-worked on Beurré Hardy or Curé.

124. KOMAROV, I. F.

The influence of amelanchier rootstock on pear scions. [Russian.]

Agrobiologija, 1951, No. 1, pp. 169-75, bibl. 2, illus. [received 1953].

A comparison made between a 12-year-old Bere Zimonjaja Mičurina [Mičurin's Winter Beurré] budded on amelanchier and a similar tree on its own roots showed that the budded tree had made slower growth, had a more spreading habit, was harder and had a shorter vegetative period. The main disadvantage of the amelanchier rootstock appears to be an uneven union with the scion (the pear being more vigorous), which reduces longevity and necessitates staking, but this is considered to be compensated for by improved frost resistance of both wood and blossom.

125. PLOCK, H.

Die Bedeutung der Myrobalane als Unterlage. (The significance of myrobalan as a rootstock.) [English summary 4 lines.]

Mitt. Klosterneuburg, 1953, 3: 211-14, illus.

Rooting of cuttings from older *Prunus myrobalana alba* hedges becomes difficult because the plants are no longer in the juvenile phase. The author grew myrobalan in the stoolbed and kept it juvenile by cutting it back severely from the second year onwards. Two-year-old stoolled myrobalans developed, on the average, 9 shoots varying in length from 0.75 to 2.10 m. The best plants are being selected.

126. DERMINE, E.

Les sujets porte-greffe utilisés en Belgique par le prunier. Rôle du Myrobalan Wibaut. (Plum rootstocks in Belgium: the Wibaut Myrobalan.)

Fruit belge, 1953, 21: 129-31.

The advantages and disadvantages are discussed of the Wibaut Myrobalan, which is much used in Belgium as a plum rootstock. Cuttings strike well and the very vigorous growth makes possible the saving of a year. Staking is required, however, and to obviate this disadvantage nurserymen prefer to double-work with Brompton or some other variety. In the orchard the Wibaut Myrobalan confers great vigour, good habit, freedom from graft swelling (except with Prune Monsieur), apparently some resistance to aphis, and good wound-healing. Trees are, however, slow to come into bearing, and late in ripening their fruit (delay of

3-7 days on good soil), and yield fruit of slightly small size; these disadvantages are less evident or non-existent on poor soils.

127. BRASE, K. D.
Western sand cherry—a dwarfing stock for prunes, plums, peaches.
Fm Res., January 1953, reprinted in *Fruit Var. hort. Dig.*, 1953, 8 (2): 23-4.

Brief notes are given on the behaviour of plum, prune and peach varieties budded on western sand cherry, *Prunus besseyi*. The species was not found satisfactory for either sweet or sour cherries.

Pollination.

128. GRIGGS, W. H.
Pollination requirements of fruits and nuts.
Circ. Calif. agric. Ext. Serv. 424, 1953, pp. 35, illus.

Data are presented on the pollination requirements under Californian conditions of the following fruit and nut plants: almonds, apples, sweet, sour and duke cherries, pears, Japanese and European plums, Persian walnuts, pecans, filberts, figs and olives. Notes are also given on the production of Calimyrna figs by hormone spraying and on the practice and limitations of artificial pollination.

129. RAPTOPOULOS, T.
 Zeitpunkt und Dauer der Blüte bei verschiedenen Obstbäumen. (**Time and duration of blossoming in fruit trees [in Greece].**)
 [English summary 10 lines.]
Mitt. Klosterneuburg, 1953, 3: 200-5, bibl. 5.

The onset of blossoming and the duration of the blossoming period at Thessalonika, Greece, were recorded in spring 1952 for many almond, apricot, peach, plum, sweet and sour cherry, pear and apple varieties. As most of the fruit varieties grown in Greece are self-sterile, it is thought necessary that the blossoming period of the main varieties should overlap by two-thirds that of the pollinator. With early flowering species, such as almonds, the entire blossoming period of all the varieties planted should be short. While the whole crop may thus be wiped out in a single night, it is more likely that in many years the blossom will escape frost damage altogether. Where any danger of frost exists, late flowering varieties, even of lesser quality, are considered preferable to early flowering varieties.—Univ. Thessalonika.

130. WILLIAMS, R. R.
Pollination requirements of cider apple varieties. Progress report, 1952.
A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 44-8, bibl. 1.

In pollen viability tests with 74 varieties, 12 varieties showed consistently low germination rates and 2 proved morphologically male sterile through failure of the anthers to release the pollen. In pollination trials Bulmer's Norman, a suspected triploid, Backwell Red, Sweet Alford and Yarlington Mill appeared to be self-sterile. Dabinett, Michelin and Sweet Coppin were self-fertile, but gave higher yields when cross-pollinated.

As cross-pollinators all varieties producing a high percentage of viable pollen proved successful.

131. WATTS, A. T. J.
Pollination of Japanese plums.
N.Z. J. Agric., 1953, 87: 20.

Factors influencing pollination are discussed briefly, and 29 Japanese plum varieties are listed with a note on their self-fertility or sterility and suggested pollinators for each in New Zealand.

132. OBERLE, G. D., AND WATSON, R.
The use of 2,3,5-triphenyl tetrazolium chloride in viability tests of fruit pollens.
Proc. Amer. Soc. hort. Sci., 1953, 61: 299-303, bibl. 4.

Samples of pollen of apple, peach, pear and grape were tested for viability with a 1.5% solution of 2,3,5-triphenyl tetrazolium chloride and for actual germination on a 1% agar/10% sucrose medium. The results indicated that pollen grains may produce red colour when treated with tetrazolium even when they are unable to germinate. It is concluded that 2,3,5-triphenyl tetrazolium is of no value as an indicator of pollen viability for these 4 species of fruit.

133. MANARESI, A.
 Ricerche sull'impollinazione del ciliegio col metodo normale e col metodo "spur-unit". (**Research on cherry pollination by the normal and the spur-unit method.**) [English summary 1/4 p.]
Riv. Fruttic., 1953, 15: 169-82, bibl. 10, illus.

Pollination studies were conducted on 11 common sweet cherry varieties (bigarreau and gean) over a period of 10 years. The usual and the spur-unit method [briefly described in *H.A.*, 23: 2585] were employed. The self-sterility of all the varieties under trial was confirmed. The best pollinators for each are listed. It was found that (1) a second pollination after 1-2 days increased fruit set by 6%; (2) the spur-unit method gave the better fruit set and yield; (3) the varieties under trial were not all equally good pollinators; (4) the sum of all the temperatures over 3° C. from 1 January to harvesting date is a constant figure (1,175° C.), as was first discovered by Swiss workers.—Ist. Colt. arb., Univ. Bologna.

Growth Phenomena

(See also 64, 104, 201m.)

134. HIEMELEERS, J.
 Les hormones en fructiculture. (**Hormones in fruit growing.**) [English summary 6 lines.]
Rev. Agric. Brux., 1953, 6: 1030-53, bibl. 45, illus.

The function of hormones in fruit trees is reviewed, largely from the literature, and reference is made to the problem of juvenility. In this connexion the author mentions two of his own, apparently unpublished, experiments: (1) A bud from a 4-month-old apple seedling was worked on M. IX, and annual bark ringing of the scion was practised from the third year onwards. Six out of ten trees bore fruit in the 6th year and the remaining four in the 7th year, whereas unworked seedlings do not normally fruit before the

10th-12th year. The physiological implications of this response to budding are discussed. (2) In 1948 seven 4-year-old apple seedlings were double-grafted (a) with Jonathan and (b) with a scion of the same, as yet sterile seedling. In the 3rd year the annual wood of Jonathan was completely covered with flower buds, while not a single bud appeared anywhere on the seedling. In 1952 seedling trees adjacent and the seedling wood of the double-worked trees bore some fruits, though many fewer than the intermediate Jonathan wood. It is concluded that the Jonathan graft did not affect the juvenile phase of the seedling.—Univ. cathol. Louvain.

135. C.S.I.R.O., AUSTRALIA.

Fruit investigations.

A.R. C.S.I.R.O., Aust., 1951/52, 1952, pp. 18-19.

Physiology of apple fruit: The principal conclusions from a survey of apple varieties at two crop levels were: (i) difference in fruit size between light and heavy crop fruit is a matter of cell size rather than cell number; (ii) varietal fruit size is mainly a matter of cell number; (iii) respiration rate per cell is closely related to cell volume both between crops and between varieties; (iv) protein nitrogen is correlated with cell size; protein synthesis keeps pace with cell size increase between crops and between varieties; and (v) light crop fruit has a higher respiration rate per unit protein than heavy crop fruit, and its shorter life and higher susceptibility to disorders may be due to this fact. *Gas storage:* Experiments were conducted with 7 apple varieties in 5% CO₂ at 33° and 36° F. compared with controls in air. Democrat proved outstandingly successful and in gas storage showed improved flavour and texture, and reduced incidence of rot over those fruits held in air storage. Jonathan and Delicious in gas also showed improved performance.

136. DERMEN, H.

The pattern of tetraploidy in the flower and fruit of a cytochimera apple.

J. Hered., 1953, 44: 31-9, bibl. 18, illus.

In the flower of a 2-2-4 (diploid-diploid-tetraploid) chimaeral Winesap apple no trace of tetraploidy was found in the sepals, petals, stamens, styles or ovules. Tetraploidy was present in bud scales. In the ovary of some flowers almost all the internal tissue was tetraploid, diploidy being confined to the epidermis. In the ovary tetraploidy made an irregular pattern in the inner tissue, suggesting that the variable and irregular shape frequently characteristic of mature fruits of 2-2-4 chimaeral apple varieties may be directly associated with the irregular occurrence of internal tetraploid tissues. The pattern of tetraploid areas in the fruit resembled that in the leaf; in both it was mostly asymmetrical. Based on cytohistological evidence, it is suggested that the lower, fleshy part of the apple flower may be considered as being a true ovary which matures into the fruit. No "carpels" could be recognized in the apple fruit of the chimaeral plant.

137. LOTT, R. V.

Major factors in the development, maturation, and ripening of apples.

Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 254-69.

The problems discussed include methods of determining the degree of maturity and changes in the fruit during ripening.

138. RUBIN, B. A., SOKOLOVA, V. E., AND ARCHIOVSKAJA, E. V.

The adaptation of respiration in apples to temperature. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, 86: 787-8, bibl. 5.

Charts are given illustrating the way in which the respiratory activity of the apple variety Antonovka in various stages of development adapts itself to the prevailing level of temperature.

139. STAEHELIN, M., AND WURGLER, W.

Considérations sur le repos hivernal des arbres et son interruption. (Reflections on the winter rest of trees and its interruption.)

Landw. Jb. Schweiz, 1953, 2 (n.s.): 959-69, bibl. 30.

The winter rest of buds consists of two distinct phases: complete rest and latent growth (dormancy); during the latter, bud burst is delayed only by the low temperatures of late winter. The mechanisms thought to govern these phenomena are discussed. The influence of cold periods (temperatures below +6° C.) on the cessation of the complete rest has been observed near Lake Geneva and it has been found that the latent growth phase usually sets in towards the end of January in stone fruit varieties, and towards the end of February—beginning of March in pome fruits. HCN gas has a certain influence on the winter rest of buds, but it is sometimes injurious if applied at the end of the latent growth phase. Ethylene chlorhydrin is effective in interrupting the winter rest, but its toxic action on the buds makes the adoption of certain precautions necessary. [Translation of authors' summary.]

140. BROWN, D. S., AND ABI-FADEL, J. F.

The stage of development of apricot flower buds in relation to their chilling requirement.

Proc. Amer. Soc. hort. Sci., 1953, 61: 110-18, bibl. 4.

In order to explore the possibility of a relationship between the stage of bud development and the intensity of rest, investigations on the development of apricot flower buds in relation to chilling requirement were undertaken during the winter of 1951-52 at Davis, California. Flower buds which were only in the early stages of development required no more chilling than did buds which were in the later stages of development. Stage of bud development is not an index of the intensity of rest or the chilling requirement. J.S.

141. DONNO, G.

Le gemme e i rami del fico. (The buds and shoots of the fig.)

Ann. Fac. Agrar. Portici, 1950/1951 [issued 1952], 19: 196-213, illus.

Fruit, vegetative, apical and lateral mixed, and adventitious buds are discussed. In pruning, weak vegetative shoots from dormant buds should be removed and apical buds carrying both wood and fruit buds left. Where vigour is insufficient some of the latter should be removed.

Fertilizers, soil management and irrigation.

(See also 4, 39, 55, 57-63, 201c, 781, 1052, 1058.)

142. LONGLEY, R. P.

The effect of heavy application of standard orchard fertilizer to apple trees.

Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 21-3.

From fertilizer trials conducted with Baldwin, King and Wagener varieties it is concluded that while heavy fertilizer application (1,600 lb. of 9-5-7 per acre) may possibly be of value for producing process apples in large quantity, it is not recommended for growing high quality, well coloured fruit.

143. TITUS, J. S.

Progress report on fruit tree nutrition studies in Illinois.

Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 66-72, bibl. 1.

The first year's results of differential nitrogen treatments of Elberta peaches and Golden Delicious, Delicious and Jonathan apples are summarized.

144. WEISSENBORN, K.

Wie lässt sich der Stickstoffbedarf der Obstbäume durch Blattanalyse feststellen? (How to determine the nitrogen requirements of fruit trees by leaf analysis.)

Mitt. ObstbVersuchsrings Jork, 1953, 8: 205-9, bibl. 5.

Data are tabulated for leaf nitrogen content of 3 apple varieties in connexion with manurial trials. A technique was developed which permits the analysis of the sap in the conducting vessels. Its advantages are its relative simplicity, its applicability in spring and in late autumn after leaf fall and the greater ease of potassium estimation. [No particulars of the method are given.]

145. ROGERS, B. L., BATJER, L. P., AND THOMPSON, A. H.

Seasonal trend of several nutrient elements in Delicious apple leaves expressed on a per cent and unit area basis.

Proc. Amer. Soc. hort. Sci., 1953, 61: 1-5, bibl. 7.

Analyses made from orchards in central Washington from 1948 to 1950, during the period 20 days after full bloom until leaf fall, have shown that on a percentage basis the N level declined rather slowly up to 140 days after bloom and then rapidly as leaf fall approached. P decreased throughout the growing season and the fall was accentuated towards the end. K declined steadily but less steeply. Ca increased rapidly during the first 65 days and then remained constant until 155 days from bloom; during the last few weeks of the season there was a further significant increase. No pronounced seasonal trend appeared to be exhibited in the case of Mg. When expressed on a unit area basis, the seasonal trend was similar except for an increase in N and a smaller increase in K at the beginning of the period and a slight but steady increase in Ca during the period 65-155 days after bloom. It is suggested that the latter results are more representative of the nutrient changes in the leaves because they are obtained irrespective of changes in dry weight of the leaves.

J.S.

146. TITUS, J. S., AND BOYNTON, D.

The relationship between soil analysis and leaf analysis in eighty New York McIntosh apple orchards.

Proc. Amer. Soc. hort. Sci., 1953, 61: 6-26, bibl. 15.

A series of chemical analyses was made in 1949 and 1950. Most results indicated significant correlations between the analysis of soil samples and of the leaves of apple trees growing in the soils from which the samples were taken, though there were wide variations in degree of correlation. Some of these variations were attributable to the sampling site (under trees or in row middles) and to soil horizons and some possibly to the method used for measuring the cation content of the soils, which is known to be approximate. Correlations were also found to vary widely in samples from orchards on soils of different "families", indicating that certain factors, not fully evaluated in this study, influence the relationship.

J.S.

147. PROEBSTING, E. L.

Certain factors affecting the concentration of N, P, K, Ca, and Mg in pear leaves.

Proc. Amer. Soc. hort. Sci., 1953, 61: 27-30, bibl. 4.

Analysis of the leaves of Bartlett and Winter Nelis pears were made at Davis, California, in 1950 and 1951. The trees were on the same rootstock and soil conditions and cultivations were uniform except that half of the 30-year-old block of trees had been grassed down since 1935. Wide differences in nutrient content were found between the two varieties and between the two types of soil management, but these have not produced much difference in tree behaviour, nor deficiency symptoms other than a slight nitrogen deficiency. This suggests that "normal" growth and yield may be accompanied by considerable variation in leaf composition. Not only the general level of the nutrients but also their ratios have been affected.

J.S.

148. TOLHURST, J. A. H., AND BOULD, C.

Nutrient placement in relation to fruit tree nutrition: IV. Experiments with urea sprays on foliage, 1952.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 55-62, bibl. 5.

The trial in Devonshire described in the last report [see *H.A.*, 22: 3429] has been continued and a second trial, also on apples, started at Long Ashton. Leaf N analyses from the older trial showed that there was no residual effect from the previous year. Urea sprays produced large and rapid, but comparatively short-lived, increases in leaf N content. Results from the older trial indicated the superiority of late spray applications (early June) and so conform to American findings but are at variance with the authors' general experience which suggests that a petal fall spray is the most effective. Observations indicate that, in contrast to ground application of N, urea sprays had little stimulating effect on a grass cover crop. Responses of trees to urea sprays have been remarkably independent of very varied weather conditions. Leaf damage resulting from urea sprays is discussed, and the problem is shown to be complex.

149. JOHANSSON, E.
Kaligödslingsförsök med äppleträd vid Alnarp 1937-52. (**Potassium manuring of apple trees; Alnarp trials 1937-52.**) [English summary p. 1.]
Medd. Trädgårdsförs. Malmö 82, 1953, pp. 11, bibl. 1.

Apple trees of 3 varieties on M. IV were planted in 1937 on a light loam soil (pH 6.3) with a fairly high P and K content. The treatments consisted of annual applications of 2.5 and 5 kg. muriate of potash, with and without the addition of N, and of 4 kg. potassium sulphate per 100 m². An increase in girth, as compared with the controls, was noted for muriate of potash and potassium sulphate in the case of Gravenstein and for potassium sulphate in the case of Mère de Ménage (Husmoder), while Filippa failed to respond to either. The effect on yield was slight, except in the case of Mère de Ménage where potassium sulphate raised yields from 21.2 to 29.4 kg. per tree per year. With all 3 varieties fruit size increased as a result of all treatments, but no effect on fruit quality was observed. It is concluded that even on a soil with a fairly high K content annual applications of about 2 kg. muriate of potash are beneficial.

150. KELLEY, V. W.
Effect of potash deficiency on the mortality of the Elberta peach during the winter of 1950-51.
Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 181-5.

Peach trees receiving potash not only grew more vigorously and produced much heavier crops, but they also withstood very low (−20° F.) temperatures better than trees not receiving any potash.

151. ANON.
Keine hungernden Obstbäume mehr. (No more starved fruit trees.)
Tech. Bauern Gärt. Ausg. G., 1953, 5: 417-18, illus.

A mechanized hand drill with a 60 c.c. engine is described which was designed for the application of fertilizers to fruit trees grown in sod. Ten to fifteen 30-35 cm. deep holes are drilled without effort under the spread of the branches and measured quantities of a fertilizer plus humus mixture are poured into them. The amount applied is calculated to act for two years, possibly supplemented by liquid manure in the second year applied through the same holes. Other uses for the drill are suggested.

152. HEWETSON, F. N.
Re-establishing the peach orchard.
Progr. Rep. Pa agric. Exp. Stat. 106, 1953, pp. 4, bibl. 5, illus.

Two experiments are described. The first one was designed to test the various theories suggested by earlier workers on the cause of unsatisfactory growth of peach following peach, and the second to obtain further data on the most successful treatments. The treatments, 10 in all, included the use of 10-10-10 fertilizer, a proprietary liquid fertilizer (Ra-Pid-Gro), manure, peat moss, BHC and bordeaux. The results obtained in both tests have shown that the liquid fertilizer has

produced strong, vigorous trees, significantly superior to those produced by the other treatments.

153. BROWN, J. W., WADLEIGH, C. H., AND HAYWARD, H. E.
Foliar analysis of stone fruit and almond trees on saline substrates.
Proc. Amer. Soc. hort. Sci., 1953, 61: 49-55, bibl. 14.

The response to salinity of six varieties of stone fruit trees grown in sand culture was studied. The effects of treatment reflected a greater influence of specific ions than of the osmotic pressure of the solutions. Calcium chloride was more toxic to the stone fruit trees than isosmotic levels of sodium chloride, the calcium ion apparently facilitating the entry of chloride. Plum and Texas almond were more sensitive to sodium in the substrate than the apricot, peach, prune and Nonpareil almond. Data on the sodium and chloride content of injured leaves are presented. [Authors' summary.]

154. SIMONS, R. K.
A progress report on soil moisture in relation to apple and peach production.
Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 55-66, bibl. 7.

Soil moisture studies have been initiated using various cultural practices to determine their influence upon fruit production in Illinois. The present report provides data on slope variations in a mature peach orchard correlated with different rates of nitrogen application; mulching versus non-mulching of mature apples; and cover crop management in a young apple orchard.

155. KIELHAUSER, G., AND PASSECKER, F.
Untersuchungen über den Einfluss des Standortes auf das Gedeihen von Obstbäumen. (Studies on the influence of locality on the growth of fruit trees.) [English summary 3 lines.]
Mitt. Klosterneuberg, 1953, 3: 205-11.

The importance of soil structure and water holding capacity of the soil is discussed, with special reference to some declining Belle de Boskoop apple trees in the Tyrol.

156. BOULD, C., TOLHURST, J. A. H., AND JARRETT, R. M.
Cover crops in relation to soil fertility and fruit tree nutrition: an experiment with bush cider trees. Final report.
A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 63-71, bibl. 3.

The layout and progress of this experiment have been reported on previous occasions [see *H.A.*, 17: 2003 and 19: 2793 and 2794]. The present paper summarizes the effects of cover crops on soil fertility, tree girth, crop yield and nutrient status over the period 1946-51. Grass-plus-clover leys made the greatest contribution to soil organic matter. None of the treatments significantly affected girth increases or yields. Grass increased the K and P status of the leaf and decreased the N status as compared with clean cultivation. Annual cover crops had no significant effect on any of the factors investigated. The trees grown on crab rootstock showed greater girth increases, crop yields and leaf Mg than those grown on M. I.

157. MEURMAN, O.
Nurmikomposti hedelmatärhassa. (Sod
mulch in orchards.)*

Publ. hort. Ass. Finland 93, 1952, pp. 3, illus.

A popular review of the sod-mulch method commonly used in the U.S.A. and now becoming more popular in Europe. The author notes the necessity for protection against rodents and shows a picture of a specially devised mill-board cylinder used for that purpose.

158. REYNTENS, H.
Méthodes de régénération du gazon des
vergers pâturés. (Methods of regenerating
the sward in grazed orchards.)

Rev. Agric. Brux., 1953, 6: 1411-19, illus.

Three different methods of sward maintenance in standard-trained grazed orchards are recommended. The first is thorough shallow treatment (8-12 cm.) with a close-bladed (25 cm. spacing) cutter followed by harrowing; complementary sowings should occur in the autumn or summer and be followed by rolling. The second consists of shallow treatment with a horizontal- or vertical-bladed cultivator; a single treatment is enough and can be followed immediately by sowing, harrowing and rolling. The third consists of strip-sowing English ryegrass between the rows of trees.

159. STEVENSON, I. L., AND CHASE, F. E.
Nitrification in an orchard soil under three
cultural practices.

Soil Sci., 1953, 76: 107-14, bibl. 20.

A peach orchard at Vineland, Ontario, has been subjected to 3 orchard management treatments since 1946, viz. (1) clean cultivation for 2 weeks in spring and then sown to buckwheat, (2) grass sod, and (3) grass sod plus yearly applications of alfalfa and straw mulch round the trees. The soil is a fine sandy loam low in lime. The treatments have resulted in different nitrifying capacities as determined by the soil percolation technique. There are indications that the mulched soil maintains a nitrifying population at a level near the maximum. The addition of lime increased nitrifying capacity significantly with the non-mulch treatments.

160. EDWARDS, R.
Practical value of irrigation for orchards.
Grower Annual Fruit Suppl., Autumn 1953,
pp. 37-9, illus.

Notes are given on the use, performance, labour requirements and cost of fixed-nozzle spraylines in orchards.

161. MINISTER OF AGRICULTURE, CANADA.
Irrigation schedule for orchards.
A.R. Canada Minist. Agric. 1952/53, 1953,
p. 91.

At Summerland, B.C., more accurate methods have been developed for determining when irrigation of an orchard should be started and when sufficient water has been applied. The procedure being suggested is to place Bouyoucos gypsum resistance blocks at a depth

of 9 in., and to irrigate when their resistance has reached 25,000 ohms. To know when to stop irrigating, it is suggested that Bouyoucos nylon resistant blocks should be placed at a depth of 4 ft. in mature orchards and not so deep in young orchards or shallower soils, and that irrigation should stop when electrical resistance readings show that fresh water has reached the blocks.

162. BROWN, D. S.
The effects of irrigation on flower bud
development and fruiting in the apricot.
Proc. Amer. Soc. hort. Sci., 1953, 61: 119-25,
bibl. 3, illus.

Results of trials on differentially irrigated Royal apricot trees in 1950-51 and 1951-52 indicate that prolonged periods of dry soil conditions in July to September cause a decrease in the number of flower buds differentiated, a delay in the time of differentiation of many flower buds and a reduction in the rate of development of buds differentiated at the normal time. Unusually cool conditions in March 1952 prolonged the blossom period of the late-developing buds and full bloom was about a month later than on trees which had been irrigated in July-September 1951. Fruit set on the late-developing trees had long stems, often with a small leaf attached. The stones of these fruits were smaller than normal and the fruits themselves were smaller and matured one to three weeks later than usual. J.S.

163. ENIKEFF, —.
L'irrigation des vergers dans la région de
Marrakech. (The irrigation of orchards in
the Marrakesh district [of Morocco].)
Fruits et Prim., 1953, 23: 178-80.

Fruit crops including olives are irrigated either by total submersion or by basin irrigation in the Marrakesh district. The advantages and disadvantages of the 2 methods are discussed. The basin method is to be preferred since it ensures satisfactory water penetration, avoids the need for repeated cultivation of the cover crop, permits better regulation of water supply and avoids run-off. Under local conditions frequent cultivation impoverishes the soil by facilitating leaching and suspension of the colloidal clay.

164. ENIKEFF, —.
L'irrigation des diverses cultures dans la
région de Marrakech. (The irrigation of
various crops in the Marrakesh district [of
Morocco].)
Les besoins en eau des plantations et des
cultures pratiquées dans la région de
Marrakech et les hydromodules. (The water
requirements of fruit and vegetable crops in
the Marrakesh district.)
Fruits et Prim., 1953, 23: 176-8, 223-5, illus.

A study was made of the water requirements of various crops in connexion with a new irrigation scheme and the results are discussed. Tables give the monthly and annual applications, the duration of the irrigation season, the number of irrigations per season, the percentage humidity at depths to 1 m. after application, and other data for olive, apricot, orange, tobacco, tomato and broad bean.

* The note given here is taken from an English summary kindly provided by the author.

Training and pruning.

165. HOBBS, E. W., AND CATLOW, E.

The establishment and performance of dessert apple trees under different systems of spacing, planting and shaping.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 30-7, bibl. 1, illus.

Four systems of planting and training are being compared in a trial planted in the winter of 1947/48 with Cox's Orange Pippin as the main variety and Laxton's Superb and Winston as pollinators, namely: (a) bush trees on M. II rootstock at 24 ft. square, (b) bush trees as in (a) with dwarf fillers on M. IX interplanted at 12 ft. in both directions, (c) single cordons on M. II at 8 ft. $\times$ 3 ft., and (d) unstaked dwarf pyramids on M. II at 8 ft. $\times$ 4 ft. Establishment costs per acre were (a) £37, (b) £116, (c) £696 and (d) £362. The methods of management adopted for each system are described and records of growth, yields and fruit quality tabulated for the first 5-year period.

166. MEURMAN, O.

Tuloksia omenapuiden alustavista leikkauskokeista. (Results of a preliminary apple pruning experiment.)*

Reprinted from *Maatalous ja Koetoim.*, 1953, 7: 104-11, illus.

Thirty-two apple trees, comprising 4 varieties on "Normandie" seedling stocks were planted in the spring of 1947 and alternate trees were used to compare the effects of the normal "European" method of pruning generally accepted in Finland with the "American" method described by Upshall in his *Bull. Ontario Dep. Agric.* 392. The former aims at an open-centre tree and involves cutting back leaders to about two-thirds of their original length with laterals pruned to form spurs. In the American system pruning is much lighter and the tree is encouraged to form a central leader. Yields from the "American" pruned trees were much the larger. The results are tabulated. They suggest, incidentally, that trees upon seedling stocks can be made to crop almost as soon as those on dwarfing stocks by apposite pruning.

167. HARRIS, N. L.

How to grow vigorous apple trees in small gardens.

R.H.S. Fruit Year Book 1954, 1953, No. 7, pp. 59-62, illus.

Two methods of restricting the growth of vigorous apple varieties are described and illustrated. The first is a type of double arcure training based on Lepage's method. In the second method 2 trees are spirally trained up a tapering cylindrical framework so that they resemble a "two-start screw thread".

168. SPRENG, H., AND OTHERS.

Bericht über die Tätigkeit der Kant. Zentralstelle für Obstbau Oeschberg-Koppigen in den Jahren 1927 bis 1952. (Report of the activities of the Central Institute for Fruit-growing at Oeschberg-Koppigen in the years 1927-1952.)

Selbstverlag der Obstbauzentrale Oeschberg, 1953, 8 $\times$ 6 in., pp. 47, illus.

In 1927 the Canton of Bern established the Zentralstelle

* The note given is based on an English summary kindly provided by the author.

für Obstbau as a department of the horticultural college at Oeschberg, which would include among its functions as an institute that of the further training of tree inspectors. The institute soon began to exercise a revolutionary influence on fruit growing all over the country, with the result that most fruit trees in Switzerland are now either trained or re-shaped according to the Oeschberg method, a technique of training and pruning which has also aroused interest in other European countries. This well illustrated report gives an account of the institute's activities during its first 25 years.

169. LALLATA, F.

Indagini sull' alternanza di produzione del melo: mezzi per interromperla. (A study of biennial bearing in the apple and means of overcoming it.)

Ann. Sper. agrar., 1953, 7: 1485-1508, bibl. 31, illus., and shorter, later account in *Riv. Fruttic.*, 1953, 15: 255-8.

Investigations in various parts of Italy in 1950 and 1951 showed that chemical thinning in an on-year at about full blossom time (1-2 applications of 20% DNOC at 0.15-0.2%) followed by hand thinning of fruitlets in an on-year resulted in bearing in the following year in the case of vigorous trees on good soil. For moderately vigorous trees on inferior soil thinning was not sufficient and had to be accompanied by ring barking (less than 15 mm. wide carried out at the beginning of flowering).

170. NERI, M.

La potatura del pesco nell' agro imolese. (Peach training in the Imola district.)

Riv. Ortoflorofruttic. ital., 1953, 37: 221-4, illus.

Notes are given on the Ferrara method in which three framework branches are trained in the form of an open vase with laterals growing horizontally outwards from them.

171. TAMIR, P.

A better dressing for the treatment of pruning wounds.

Plant Dis. Rept., 1953, 37: 259, bibl. 2.

A home-made wound dressing called Sheged that has proved very successful in Israel is prepared by melting 1 lb. beeswax in 1 lb. motor oil and then adding 1 lb. commercial lime powder. If the resultant paste is too hard more oil is added, if too soft, more lime. Preliminary investigations suggest that the addition of hormones such as 2,4-D or of fungicidal materials such as zinc oxide may result in quicker and cleaner healing.

172. CONGDON, N. B.

Methods of collecting and disposing of prunings.

N.Z. J. Agric., 1953, 87: 18-19, illus.

Illustrated notes on light mobile furnaces for burning prunings and on the use of sheets, harrows combined with hay sweeps, and buckrakes for collecting them.

Spraying for cultural purposes.

173. VRIJHOF, B.

Chemische bloemdunning op vruchtbomen. (Chemical blossom-thinning of fruit trees.)

[English summary $\frac{1}{2}$ p.]

Meded. Dir. Tuinb., 1953, 16: 460-72, bibl. 9.

The results of 2 years' trials and 1 year's commercial experience in blossom-thinning of apples, pears and plums with DNC and NAA are reported from Holland. Regular heavy-bearing varieties of apple and biennial varieties in their on year are considered the most suitable for chemical blossom-thinning. Results with pears were very variable. Czar plums responded very well to DNC sprays and no foliage damage was caused. DNC tended to cause foliage damage on apples but the trees soon recovered. NAA rarely caused injury to the foliage unless sprayed after blossom fall, when the injury was persistent.

174. ABBOTT, D. L.

Growth substances as fruit-thinning agents for apples and pears: progress report.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 40-4, bibl. 1.

1. 1-naphthaleneacetic acid was applied 8 days after petal-fall at concentrations of 5-30 p.p.m. as a thinning agent to three varieties of apple. 2. Miller's Seedling and Edward VII responded with a reduced fruit-set at the higher concentrations. Crawley Beauty was considerably thinned at all concentrations. 3. An increase in mean fruit weight was obtained only with Crawley Beauty. So great was the degree of thinning, however, that the marketable crop from the treated branches was less than that from the controls. 4. Four varieties of pear were sprayed with 1-naphthaleneacetic acid and 2-naphthoxy- α -propionic acid at full bloom and 7 days after petal-fall. Contrary to the results of the 1950 trials, some reduction of fruit set was obtained with Williams and Conference, but further trials will be necessary to confirm the thinning effect of growth substances on pears. [Author's summary.]

175. MURNEEK, A. E., AND TEUBNER, F. G.
The dual action of naphthaleneacetic acid in thinning apples.

Proc. Amer. Soc. hort. Sci., 1953, 61: 149-54, bibl. 12, being J. Ser. Pap. Mo. agric. Exp. Stat. 1321.

From observations made in 1952 on vigorous, heavily bearing trees of 3 apple varieties sprayed post-blossom with NAA at either 30 p.p.m. or 40 p.p.m., it is concluded that, among the many factors contributing to successful thinning with NAA, 2 physiological effects are prominent. These are a strong and prolonged inhibition of embryo development (negative effect) and a temporary retardation in separation of cells along the abscission zone of the pedicel (positive effect). It is believed that a relationship between these 2 influences largely determines the extent of induced abscission, the inhibition of embryo function (hormonal) and development having by far the more important effect.

176. KELLEY, V. W.

Results of the 1952 chemical peach thinning tests.

Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 228-31.

Thinning with growth substances at 2 weeks after shuck fall, which was the most effective stage, was accomplished by increasing the June drop. Most thinning occurred when the foliage was most vigorous, a response which is very different from that observed

on apples where most thinning was accomplished when the foliage was the least vigorous.

177. HO[UTER, P. J.]

Gebruik van de nevelspuit voor chemische bloesemdunning. (The use of mist sprayers for chemical blossom thinning.)

Gebruik van de nevelspuit voor chemische vruchtdunning. (The use of mist sprayers for chemical fruit thinning.)

Jaarversl. Inst. TuinbTech. Wageningen, 1952, pp. 46, and 46-7.

In a comparison of low volume and normal power spraying with DNC for blossom thinning of apples, equally good results were obtained with both methods, but higher concentrations were needed with the low volume machine. For fruit thinning with NAA, low volume spraying gave better results with Goudreinette and less good results with Sterappel than normal power spraying.

178. FISHER, D. V., AND OTHERS.

Chemical fruit thinning with concentrate spray machines.

Proc. Amer. Soc. hort. Sci., 1953, 61: 144-8, bibl. 1, being Contr. Div. Hort., exp. Fms Serv., Dep. Agric., Ottawa 792.

Experiments on the chemical thinning of apples and apricots with dinitro compounds in British Columbia are described. Effective results have been obtained using concentrate spray machines. J.S.

179. MITCHELL, A. E.

How to prevent pre-harvest drop of apples. Experiences in Michigan with TCPPA.

Wis. Hort., 1953, 43: 244-5, 253.

Observations made by growers on the use of 2,4,5-trichlorophenoxypropionic acid (TCPA [or 2,4,5-TP]) to prevent pre-harvest drop of apples are reported. On the basis of these observations the following recommendations are made. For early summer varieties TCPA should be used at the low rate of 5-10 p.p.m. to prevent the fruit becoming overripe before harvest, while for varieties maturing at the same time as Wealthy, 10-15 p.p.m. may be used. Selective picking is recommended in both cases. Varieties maturing at the same time as McIntosh or later can safely be sprayed with 10-20 p.p.m. TCPA, but if intended for storage they must be picked at the correct time. Increased red colour in the fruit appeared to be related to the degree of maturity and not to any direct stimulation by the growth substance.

180. LOTT, R. V.

Effects of 2,4,5-trichlorophenoxypropionic acid sprays on the fruits of important Illinois apple varieties.

Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 37-45.

The material, also known under several trade names such as Color-Set, Stikcol, Fruitone-T, was used on 2 apple varieties in 1950 and on 22 in 1951. Its effect on fruit drop, texture, colour, quality, maturation and storage of the different varieties is discussed. Results to date indicate that it can be used satisfactorily on Jonathan, Delicious, Starking and Turley among others.

181. SOUTHWICK, F. W., DEMORANVILLE, I. E., AND ANDERSON, J. F.
The influence of some growth regulating substances on pre-harvest drop, color and maturity of apples.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 155-62, bibl. 4, being *Contr. Mass. agric. Exp. Stat.* 853.

Experiments on McIntosh and other apples with 2,4,5-TP and NaNAA are described. The former was superior to the latter for controlling pre-harvest drop if applied a few days before, or at the time, natural abscission begins. Earlier applications were less effective. A concentration of 20 p.p.m. 2,4,5-TP is more effective for drop control than 10 p.p.m. The use of 2,4,5-TP about three weeks before harvest is apt to have a pronounced stimulating effect on the rate of ripening and colour development of early and mid-season apples. With late varieties, a treatment 5 weeks before harvest may have a similar effect. Apple varieties vary in their ripening and colour responses to 2,4,5-TP, and within a variety responses may vary from one block of trees to another or from one part of a tree to another. J.S.

182. WHITE, D. G.
Promotion of red color of apples. II. Effects of preharvest sprays of certain chemicals in multiple combinations.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 180-4, bibl. 5, being *Pap. J. Ser. Pa agric. Exp. Stat.* 1754.

The purpose of the experiment was to find out whether certain compounds sprayed on Delicious trees five weeks prior to harvest would enhance fruit colour. Of 26 treatments, 18 gave considerable increases in red colour and all of these were paired or multiple combinations of compounds. Some of the treatments resulted in apples which were softer than untreated checks after storage until January. A combination spray of 25 p.p.m. 2,4,5-T and 10 p.p.m. 2,4,5-TP resulted in a considerable increase in the red colour of inside apples and had no appreciable effect on the firmness of the fruit. Four other useful combinations are listed. J.S.

183. BILLERBECK, F. W., DESROSIER, N. W., AND TUKEY, R. B.
The influence of 2,4,5-trichlorophenoxypropionic acid on the color of red-fruited apple varieties.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 175-9, bibl. 13, being *J. Pap. Purdue agric. Exp. Stat.* 646.

TCPPA [2,4,5-TP] when applied to apple trees at Lafayette, Indiana, in 1951 as a foliar spray two to four weeks prior to normal harvest increased the intensity of red coloration of Starking, Delicious, Turley and Red Rome (Gallia Beauty) varieties. The amount of red colour stimulation varied with the time of application, the number of applications and the variety. Whether the effect is sufficient to be of economic importance is doubtful excepting in particular instances which cannot be foretold. [Authors' summary.]

184. HARRIS, R. W., AND OTHERS.
2,4,5-T sprays on stone fruit.
Calif. Agric., 1953, **7** (9): 8-9, illus.

In exploratory spraying trials in 1951 and 1952 on cherries, plums, prunes, peaches and nectarines the alkanolamine salt of 2,4,5-trichlorophenoxyacetic acid at various concentrations resulted in some cases in earlier fruit maturity, increased fruit size, enhanced colour and reduced pre-harvest fruit drop. Adverse effects varied from none to misshapen fruit, uneven maturity, poor flavour and severe injury and even death of the trees. In addition, 2,4,5-trichloropropionic acid (2,4,5-TP) applied to prunes was effective, but less so than 2,4,5-T, in retarding fruit drop.

185. CRANE, J. C.
Further responses of the apricot to 2,4,5-trichlorophenoxyacetic acid application.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 163-74, bibl. 7, illus.

Investigations were made at 2 sites in California during 1952 to determine the response of apricot trees to applications of different formulations of 2,4,5-T. Spray applications of the trialkylamine and ammonium salts of 2,4,5-T applied to three varieties induced similar responses with regard to increasing fruit size and hastening maturity. Red colour development occurred only in the cooler of the two locations chosen. Sprayed fruits had a higher moisture content and greater fresh and dry weights than unsprayed fruits. The optimum time of application appeared to be shortly after pit hardening had begun. Applications of these compounds also reduced pre-harvest drop. Application of the propylene glycol butyl ether ester of 2,4,5-T caused severe injury. J.S.

186. RYALL, A. L., AND DEWEY, D. H.
Post-harvest treatments to hasten ripening of early-season Bartlett pears for the fresh market.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 251-6, bibl. 6.

Two shipping tests were conducted with early-season Bartlett pears to determine the effects of post-harvest treatment with ethylene or 2,4,5-T on the rate of ripening at transit temperatures. Holding tests were also made to determine the effects of similar treatments on Bartlett pears subsequently held at 50° F. for a simulated transit period. Both ethylene and 2,4,5-T increased the rate of softening at transit temperatures as compared with untreated lots. Ethylene treatment prior to shipment or holding at 50° F. resulted in more rapid development of yellow skin colour but 2,4,5-T usually caused a blotchy appearance. [From authors' summary.]

187. DEWEY, D. H., AND UOTA, M.
Post-harvest applications of chemicals for ripening cannery Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 246-50, bibl. 7.

Post-harvest applications of 2,4-D and 2,4,5-T hastened the ripening of Bartlett pears in some instances, but, for the most part, ethylene proved to be a better ripening agent. Ethylene produced a bright and uniform colour as the fruit ripened. Response to 2,4,5-T varied with the degree of maturity of the fruit at the time of treatment. J.S.

188. UOTA, M., AND DEWEY, D. H.
The respiration and volatile emanation of Bartlett pears as influenced by post-harvest treatment with ethylene and 2,4,5-T.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 257-64, bibl. 10.

Post-harvest applications of 2,4,5-T (200 p.p.m.) and ethylene (20-30 p.p.m.) at 70° F. were* effective in accelerating the rate of respiration of pre-climacteric Bartlett pears. The riper fruits were more responsive to ethylene. The production of volatiles other than ethylene was found to be brought about by both substances in about the same order as was carbon dioxide production. The effects of both compounds were greatly reduced when applied to the fruit at 70° F. following a 15-day period of cold storage at 35° F. [From authors' summary.]

Composition.

(See also 201w.)

189. TEUBNER, F. G.
Identification of the auxin present in apple endosperm.

Science, 1953, **118**: 418, bibl. 3.

Studies at Columbia, Mo., on apple endosperm gave very good agreement with Rf values found by Luckwill [*Nature*, 169: 375; *H.A.*, 22: 2071]. There is, therefore, a strong indication that the native auxin of apple endosperm is the ethyl ester of indoleacetic acid and that this substance may be of somewhat widespread occurrence in other plants.

190. DATE, W. B., AND HANSEN, E.
Influence of ripening and storage on the extractable juice content of pears.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 218-22, bibl. 1, being *Tech. Pap. Ore. agric. Exp. Stat.* 760.

The effect of variety, length of storage and ripeness upon the extractable juice content of Oregon pears has been investigated. In the 3 varieties studied, the amount of juice which could be extracted by pressure increased rapidly during ripening and was inversely correlated with the pressure test. The maximum amount of juice was obtained from pears ripened after comparatively short periods of storage. Bartlett and Anjou pears contained more extractable juice than Bosc pears. The highest values in relative viscosity were found in fruit ripened early during the storage season. [From authors' summary.]

Harvesting, packing and marketing.

(See also 77, 80g, 201e.)

191. HILKENBÄUMER, F.
Ernte, Sortierung und Verpackung von Kern-, Stein- und Beerenobst. (Harvesting, grading and packing of pome, stone and small fruit.)
Zweckmässige Arbeitsweise in Obstbau, 1953, Hft 8/9, pp. 111, illus., DM. 2.80.

In this practical brochure, as in others of the series,

detailed illustration of all operations by line drawings is an outstanding feature.

192. ELLINGHAM, G.
A new top fruit harvesting technique.
Comm. Grower, 1953, No. 3011, pp. 482-3, illus.

The system is based on the exclusive use of light, non-returnable, half-bushel, wood and veneer boxes for picking, storage and marketing. The boxes are light and can be fitted with straps for picking. Time spent and damage done in emptying picking buckets into orchard containers is eliminated. Only a few empties are required during grading and packing, with a consequent saving of time and space.

193. WI[CHERS, A. J.]
Analyse van het tijdgebruik bij het plukken van hard fruit. (Time study of hard fruit picking.)
Jaarversl. Inst. TuinbTech. Wageningen, 1952, pp. 51-3.

1. When picking bush apples from the ground there was little difference in rate of picking whether workers used one hand or two. 2. Picking from the ground was about 20% quicker than picking from ladders. 3. When picking standard apples from a ladder, only about 26% of the actual picking time (exclusive of moving ladders and emptying containers) was spent in picking; the rest was spent mainly in placing the fruit in the container. This points to the importance of having the container in a convenient position. [See also *H.A.*, 23: 257.]

Storage.

(See also 78, 135, 201g, t.)

194. PADFIELD, C. A. S.
Effects of delay between harvesting and cool-storing on Sturmer Pippin apples.
N.Z. J. Sci. Tech., Sect. A, 1953, **35**: 152-8, bibl. 2.

Sturmer Pippin apples from six different orchards in the Hastings area were subjected to varying delays between picking and storing in cool-chambers. As the length of delay before storing increased, quality of the fruit on removal from store decreased. Quality was lowered by a falling-off in hardness and by a sharp rise in the incidence of storage disorders. Bruise incidence was not reduced by pre-storage delay, but bruise appearance was altered. It is concluded that Sturmer apples should be placed in cool-store as soon as possible after picking. [Author's summary.]—Havelock North.

195. C.S.I.R.O., AUSTRALIA.
Fresh fruit storage.
A.R. C.S.I.R.O., Aust., 1951/52, 1952, p. 82.

There was no indication that the number of days from full bloom is a better criterion of maturity for picking apples for long storage than the present method recommended, which is the change of ground colour. Various methods of preventing rotting (blue and grey moulds) in stored Winter Cole pears, including the use of pre-harvest field sprays, careful handling and post-harvest dips are being investigated. Borax, boric acid and a waxing process ("Keepswell") continued to give

good results in control of orange wastage due to green mould. A comparison of the effect of pulling and clipping on mould wastage in Navel and Valencia oranges showed that with more mature Navels and with Valencia oranges harvested at 3 different maturities, clipping greatly reduced green mould as compared with pulling. Experiments on the shed storage of lemons have shown that a post-harvest dip of 2,4-D gave excellent results in control of stem-end rots; used in conjunction with pre-harvest field applications of bordeaux mixture it promises to be most effective.

196. EAVES, C. A.

Cold storage and plant nutrition.

Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 47-58, illus.

Investigations into the bruising of McIntosh apples showed that of the 3 picking containers used, namely bags and canvas lined baskets, both with false bottoms, and baskets, least bruising occurred with lined baskets. In a study on Cortland apple nutrition, delayed maturity, increase in fruit size and decrease in colour appeared to be associated with lime and N applications. Reduced firmness and rotting in storage was associated with N treatments. McIntosh apples stored in 7% CO₂ at 38° F. and Red Spy and Northern Spy apples in 6% CO₂ at 40-45° F. were found to be in very good condition in May. Recommendations are also made for the gas storage of other varieties. It has been consistently observed that fruit held in modified atmospheres remains in good condition longer than similar fruit from ordinary storage, and the general belief that it is necessary to dispose of fruit after removal from gas storage is refuted, provided the temperature is kept at 40° F. or below. Notes are given on the influence of mulch upon nutrient levels of raspberries and strawberries, and the nutritional status of cucumbers was ascertained under a variety of conditions. [See also *H.A.*, 23: 2589.]

197. SHUTAK, V. G., CHRISTOPHER, E. P., AND HINDLE, R., Jr.

Effect of mineral oil on respiration and transpiration of apples.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 223-7, bibl. 4, being *Contr. R.I. agric. Exp. Stat.* 808.

Dipping stored apples in 3% mineral oil emulsion reduced the rate of apparent respiration of McIntosh, R.I. Greening and Cortland. Treated fruit was found to be firmer and some had a darker green ground colour. Weight loss was substantially decreased. Taste panels were unable to detect any off-flavours. Shelf-life was prolonged. With R.I. Greening some fruit developed internal pitting and browning and the oil treatment may have aggravated this condition. Mineral oil emulsion may be useful in treating Cortland apples to reduce scald. J.S.

198. SHUTAK, V. G., AND CHRISTOPHER, E. P.
Effects of mineral oil on storage scald of apples.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 233-6, bibl. 8, being *Contr. R.I. agric. Exp. Stat.* 805.

Mineral oil emulsions up to 3% may be used safely as dips for Cortland apples and give satisfactory scald control if applied before the fruit is stored. R.I. Greening apples may suffer injury. J.S.

199. SHUTAK, V. G., CHRISTOPHER, E. P., AND PRATT, L. C.

Role of cutin in storage scald.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 228-32, bibl. 10, being *Contr. R.I. agric. Exp. Stat.* 807.

Cortland apples were washed with alcohol, brushed once or twice, or rubbed with a water paste of pumice stone to remove some of the waxy deposit on the skin before storage at 32° F., and the effects on post-storage weight losses and scald determined. The results indicate that the cuticle of the apple plays a very important role in influencing the amount of scald, and that the amount of scald is not completely pre-determined in the early part of the storage season and may be affected by later treatments even after the fruit is removed from storage. The evidence suggests that scald is caused by an accumulation of a toxic substance or substances inside the fruit. The waxy coating on the fruit appears to serve as a barrier or regulator controlling accumulation of these substances. Most of the cells affected by scald would appear to be killed after removal of the fruit from storage.

200. HENZE, R. E., BAKER, C. E., AND QUACKENBUSH, F. W.

The chemical composition of apple storage volatiles. I. Acids, alcohols and esters.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 237-45, bibl. 15, being *J. Pap. Purdue agric. Exp. Stat.* 679.

The volatile organic components from stored apples were analysed. The neutral fraction which constituted 98% of the total extract consisted mainly of esters. The ester fraction on hydrolysis yielded six alcohol fractions and seven acid fractions. Details are given. J.S.

Noted.

201.

a BRANZANTI, E. C., AND RICCI, A.

Varietà di pesche promettenti in osservazione all'azienda zootecnica ravennate dell'ispettorato provinciale dell'agricoltura di Ravenna. I. Pesche: Maglia rosa, Dixired, Dixigem, Gialla di Piangipane. (Promising varieties of peach under observation in the Ravenna Zootechnical Farm of the Provincial Inspectorate of Agriculture, Ravenna. I. Maglia rosa, Dixired, Dixigem and Gialla di Piangipane.) [English summary ¼ p.] *Riv. Fruttic.*, 1953, **15**: 209-26, illus.

b BREVIGLIERI, N.

Il miglioramento genetico delle razze per la coltura industriale. (Breeding as a means of improving commercial production.) *Humus*, 1953, **9** (6/7): 30-7, illus. Apples, pears, plums, dessert grapes and other fruits.

- c DUMAS, M.
Étude préliminaire des teneurs en azote, acide phosphorique et potasse du feuillage du cerisier en vue de l'application du diagnostic foliaire à cet arbre. (Preliminary investigation of the nitrogen, phosphoric acid and potassium contents of cherry leaves with a view to foliar diagnosis.)
C.R. Acad. Agric. Fr., 1952, **39**: 365-9.
The morphology and chemical composition of the leaves varied with the type of branch.
- d ELLENWOOD, C. W., AND OTHERS.
Fruit varieties for Ohio. Descriptions of recommended and new varieties, with planting directions.
Res. Circ. Ohio agric. Exp. Stat. **21**, 1953, pp. 59.
Top and small fruits.
- e FERO.
Al primo posto sul mercato tedesco. (The German [fruit] market.)
Humus, 1953, **9** (6/7): 61-6.
For citrus and other fresh fruit, and dried figs.
- f FLORIANI, F.
Aspetti tecnico-economici della frutticoltura nell'alta val Sugana. (Trentino.) (Technical and economic aspects of fruit growing in the upper Sugana valley, in the Trentino.) [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1953, **37**: 204-17, illus.
Pears and apples.
- g FOLLEY, R. R. W.
Costs and returns of apples kept in store.
Grower Annual Fruit Suppl., Autumn 1953, pp. 57-9.
- h HOBBS, E. W.
Fruit growing in the west of England.
Grower Annual Fruit Suppl., Autumn 1953, pp. 5-9, illus.
- i KEMMER, E.
Über das Notwendige im deutschen Obstbau. (The reorganization of fruit growing in Germany.)
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Modernization of methods urged.
- j LAMB, R. C.
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Bibl. Ser. No. 2, 1953, pp. 135, bibl. 842, indexed, [mimeo.].
- m LOTT, R. V.
Some effects of temperature upon the development, maturation, and ripening of apples and peaches.
Trans. Ill. St. hort. Soc. for 1952, 1953, **86**: 209-18.
Summarized information from many sources.
- n VAN DER MEULEN, A.
Plastics in plant propagation.
Fmg S. Afr., 1953, **28**: 238, 244, illus.
Plastic wraps for budding, grafting and marcotting.
- o POST, J. J.
Klimaatverschillen en de tuinbouw. (Climatic differences between certain districts in the Netherlands and their suitability for fruit production.) [English summary 11 lines.]
Meded. Dir. Tuinb., 1953, **16**: 649-53, map.
- p RENAUD, M.
Observations effectuées en 1948-49 sur les variétés fruitières du département de Constantine. (Observations made in 1948-49 on fruit varieties in the department of Constantine [Algeria].)
Fruits et Prim., 1953, **23**: 217-22.
Citrus, apricot, almond, cherry, peach, plum, pear and apple.
- q SCHWEIZERISCHER OBSTVERBAND.
Verzeichnis der schweizerischen Kernobstsorten und Vorschriften über die Grössenklassierung. (A list of Swiss pome fruit varieties and regulations on size grades.) [German and French.]
Obstrundschau, 1953, Vol. 13, No. 18, pp. 4.
- r SPAGNOLI, A.
La frutta rappresenta un decimo della nostra produzione agricola. (Fruit represents a tenth of Italian agricultural production.)
Humus, 1953, **9** (6/7): 7-14.
Area, production, exports, pulp, dried fruit, citrus.
- s TERMOHLEN, G. P.
Ket kweken op schurftresistentie bij appel en peer. (Breeding for scab resistance in apples and pears.) [English summary $\frac{1}{2}$ p.]
Meded. Dir. Tuinb., 1953, **16**: 519-32, bibl. 10, illus.
Methods described and evaluated. [See also *H.A.*, 23: 1518.]
- t ULRICH, R., RENAC, J., AND MIMAUULT, J.
Différences de comportement physiologique de pommes Calville en fonction de la température de conservation. (The behaviour of Calville apples under storage at different temperatures [0, +4, +7 and +10° C.].)
C.R. Acad. Agric. Fr., 1953, **39**: 368-70.
Preliminary report.

- u W[ICHERS, A. J.]
Analyse van het tijdgebruik bij het plukken van kersen. (Time study of cherry picking.) *Jaarversl. Inst. TuinbTech. Wageningen* 1952, pp. 48-9.
- v WILLIAMS, A. H.
The tannin of apple juice and cider: an interpretation of the permanganate titration method.
A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 219-24, bibl. 12.
- w WILLIAMS, B. L., AND WENDER, S. H.
Isolation and identification of quercetin and some quercetin glycosides from plums (*Prunus salicina*).
J. Amer. chem. Soc., 1953, **75**: 4363-4, bibl. 4.
- x ZUCCHINI, M.
Frutticoltura emiliana, frutticoltura dei primati. (Emilian fruit growing.)
Humus, 1953, **9** (6/7): 25-9, illus.
Top fruit and strawberries in an Italian province.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(See also 6, 8, 10, 50, 55, 77, 82, 201x, 244a-c, 276, 1034, 1042, 1048, 1061c.)

202. EATON, E. L.
Native fruits.
Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 32-6, illus.

Blueberries: For standard highbush varieties, spacing of 8×8 ft. or 10×5 ft. is recommended. Notes are given on breeding, and the parentage of the most promising highbush progeny is listed. In propagation trials, Kengrape and Pioneer, two varieties that have been somewhat difficult to root in shaded-peat frames, rooted freely on the stems when mounded with peat or sawdust for 2 years. Over 90% rooting was obtained from cuttings set in undisturbed peat under 50% lattice shade without glass. Sawdust applied as a mulch or worked into the soil was found very beneficial for the growth of blueberries. **Cranberries:** Among seedlings and clonal selections from 18 distinct sources, one early and one late variety were found promising. **Elderberries:** This fruit, used for blending with apple, has not yet been adopted by commercial processors, but is in great demand for home gardens. When dormant cuttings are placed in damp sand or sawdust, they root freely at each node, grow rapidly and fruit in 2-3 years. Brief notes are given on breeding.

203. GROVEN, J.
Storfrugtede blåbaer. (Large-fruited blueberries.)

Horticultura, 1953, **7**: 101-4, bibl. 2.

Cultivated blueberries could be grown in Denmark. American varieties and their requirements are discussed.

204. SERGEEVA, K. D.
Mildew resistant, black fruited forms of gooseberry. [Russian.]

Sad i Ogorod, 1953, No. 9, pp. 67-8, illus.

At the Mičurin Fruit Research Station a hybrid of 2 wild gooseberries was pollinated with mixed pollen of 3 European varieties of gooseberry, producing a new type. Selections of the most promising progeny retained the valuable characteristics of the wild species, such as mildew (*Sphaerotheca*) resistance, reduced thorniness, vigorous growth and heavy production of dark, almost black berries; the size and quality of the fruit was improved. The plants available at present are hardy, root easily, may provide material for further breeding and are recommended for planting in mixed shelter belts.

205. ANON.
New thornless raspberry.

Amer. Nurserym., 1953, **98** (4): 56.

Canby, a new thornless red raspberry, has been developed at Oregon Agricultural Experiment Station. Yields have averaged more than 3 tons per acre. The fruit is very suitable for the fresh market and for frozen pack.

206. HUDSON, J. P.
Factors affecting the regeneration of root-cuttings.

Nature, 1953, **172**: 411-12, bibl. 1.

Propagation by root cuttings.

Gdnrs' Chron., 1953, **134**: 200, 201, illus.

Most of the initial work on the propagation of horticultural plants by root cuttings was carried out with the raspberry varieties Lloyd George and Malling Promise. Roots from plants up to 2 years old were made into cuttings, 8-12 cm. long and 2-4 mm. in diameter. The cuttings were planted horizontally (a) in heated glass-houses, 2-3 cm. deep; (b) in unheated frames, 2-3 cm. deep; and (c) in open ground in full sun, 3-5 cm. deep. With all 3 treatments by far the highest percentage of success was obtained from cuttings taken in the winter months. In addition to this general seasonal response the roots also showed definite tendencies in their responses to different environments. In the glasshouse the proportion of success rose to a peak (about 80%) for cuttings inserted during January-March, whereas out of doors the peak was reached during October-December, and the cold frames produced intermediate results. Thus it appears that the later cuttings are taken in the "on" period the warmer must be the environment to promote growth and regeneration. Details of the methods used with raspberry will be described elsewhere. The experiments have been extended to include the propagation of a wide range of herbaceous and shrubby plants by root cuttings grown under various environmental conditions.—Dep. Hort., Univ. Nottingham School Agric.

207. CRAIG, D. L.

Small fruits.

Progr. Rep. Domin. exp. Stat. Kentville for 1947-51, 1953, pp. 28-31, illus.

Strawberries: Forty-two varieties were tested during the 5-year period covered by this report, and 6 of those, listed in order of ripening, are recommended. Mulching to date has not shown any significant difference in yields or in winter injury to the plants. The mulches,

however, tended to delay fruiting and to extend the fruiting season by 2-3 days. Growing strawberries on the hill system is being investigated, and notes are given on the plant improvement programme and breeding. *Raspberries*: Varieties are suggested. In a mulching experiment plots under sawdust had the highest moisture content and produced the best yields. *Currants* (red, black and white) and *gooseberries*: Varieties are recommended. *Grapes*: Varieties for home gardens and especially favourable areas are recommended. *Hops*: Commercial production was found uneconomical in Nova Scotia.

208. WALDO, G. F.

Sources of red stele root disease resistance in breeding strawberries in Oregon.

Plant Dis. Reptr., 1953, 37: 236-42, bibl. 3, being *Tech. Pap. Ore. agric. Exp. Stat.* 772.

Progeny derived from crosses between *Fragaria chiloensis* and standard varieties have shown remarkable vigour, but neither F₁ nor F₂ seedlings produced fruit of commercial value. Further crossing and selection has, however, produced more promising types, though the fruit is still rather small. Resistance to red stele (*Phytophthora fragariae*) has been obtained and maintained through several generations, but this resistance would appear to be a matter of degree rather than absolute; in certain vigorous selections portions of the root system are attacked, but recover rapidly in the spring. Cases of loss or breakdown of resistance as observed by Reid [see *H.A.*, 23: 432] have been noted; these have been due to the appearance of new races of the fungus.

209. FALCH, J., AND STRAUSS, E.

Sortenvergleiche und Leistungsprüfungen im Erdbeersortiment 1953. (*Strawberry variety trials 1953.*) [English summary 3 lines.]

Mitt. Klosterneuburg, 1953, 3: 243-7, illus.

But few of the varieties tested are known in Great Britain. Data on yield, quality and composition are tabulated.

210. VAN RAALTE, D.

Nieuwe aardbei-rassen op de Internationale Gartenbau-Ausstellung te Hamburg. (New strawberry varieties at the International Horticultural Exhibition at Hamburg.)

Cult. Hand., 1953, 19: 453-5, illus.

Descriptions are given of the following new German strawberry varieties: the Senga varieties, Prof. Dr. Settegast, Papa Lange, Gartenbaudirektor Meymund, Direktor Paul Wallbaum, Macherauch's Frühernte, Regina and Georg Soltwedel.

211. KRONENBERG, H. G., AND GARRETSEN, F.

Opbrengstproven met aardbeiklonen. (*Trials with strawberry clones.*)

Meded. Dir. Tuinb., 1953, 16: 737-43, bibl. 1.

The results of field trials, in which yield, vigour and percentage of misshapen fruits are recorded, are presented for a number of Dutch strawberry clones tested in several localities and seasons.

212. ARNEY, S. E.

The initiation, growth and emergence of leaf primordia in *Fragaria*.

Ann. Bot. Lond., 1953, 17: 477-92, bibl. 3.

The leaf initiation rate in *Fragaria vesca* (var. Royal Sovereign) has been compared with the elongation rate of the leaf primordia at different seasons. Certain conceptions of growth correlation within the bud are presented. Experiments on the nature of elongation and emergence of primordia are described and the causes of emergence are discussed. [Author's abstract.]

213. KIESER, M. E., POLLARD, A., AND TIMBERLAKE, C. F.

Factors affecting the quality and chemical constituents of strawberries: effects of manurial treatments.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 163-77, bibl. 6.

Auchincruive Climax strawberries were harvested in ripe condition during the 1951 and 1952 seasons from plots which had received the same manurial treatment since 1928. The levels of N, P and K had been varied and an FYM treatment included for comparison. The plants were in their 1st and 2nd years of cropping. Quality was assessed by a tasting test score, and by determination of ascorbic acid, total sugars, titratable acidity and pectin levels; crop weights were also recorded. In both seasons, plots receiving N and NP gave the fruit of poorest quality and lowest yield; FYM, NPK and NK gave consistently high yields and quality in both years, while PK gave fruit intermediate in both quality and yield in 1951, but of improved quality in 1952. In both years the fruit of best quality was obtained in the earlier half of the season; the highest crop weights were given in the middle of the harvesting period. The results of manurial treatments became increasingly apparent at the later harvests in each year. The results of the tests for the two seasons therefore confirm the earlier findings of Knight and Wallace [see *H.A.*, 2: 351], that an adequate supply of potash is of major importance in the nutrition of strawberries, and show that the application of P to K-deficient plants enhances the deterioration in both yield and quality of fruit. [Authors' summary.]

214. HO[UTER, P. J.]

Nawerking van belichting bij aardbeienteelt onder glas. (The effect of illumination on the subsequent crop of strawberries under glass.) *Jaarversl. Inst. TuinbTech. Wageningen* 1952, pp. 40-1.

Illumination of Dutch Evern strawberries in frames in the autumn had no significant effect on yield the following spring. A heavier crop was obtained from the east than the west side of a row of double-span frames running north-south, and the number of rotten fruits was smaller. This is contrary to the results obtained the previous year. After harvest the plants were given short-day treatment and the frames heated in autumn with incandescent lamps or electric cables. The electric cable method gave the highest yields, followed by the unheated (control) frames, the incandescent lamps being least satisfactory. The back row of the frame gave the worst crop, and the second row from the front gave the best.

215. GERRITSEN, J. D.

De teelt van aardbeien onder platglas. (The culture of strawberries under Dutch lights.) [English summary $\frac{1}{2}$ p.] *Meded. Dir. Tuinb.*, 1953, 16: 487-500, bibl. 6, illus.

Details are given of methods and problems of strawberry production in Holland, and the economic value of the crop is discussed.

216. CARLSON, R. F.

Inhibition of runner plants in the strawberry (*Fragaria* spp.) by chemical treatment. *Proc. Amer. Soc. hort. Sci.*, 1953, 61: 201-17, bibl. 25, illus., being *J. Art. Mich. agric. Exp. Stat.* 1399.

Several chemicals were tested on several varieties. Dichloral urea (DCU), phenoxyethyl trichloroacetate (PE-TCA) and 2,4-D were most effective in reducing runner formation. Under field conditions the most effective concentrations were (per acre) DCU 5 lb., PE-TCA 3 lb. and 2,4-D $1\frac{1}{2}$ lb. For maximum inhibition of runners two applications were needed at the time of actual runner initiation and development. The timing was important. First year strawberries should be sprayed in the first part of June and again in July, the second year or fruiting bed about the middle of July and three weeks later. Some difference in varietal response was noted. J.S.

217. ANON.

Carbon dioxide for soft fruit storage. *Comm. Grower*, 1953, No. 3010, pp. 437-8, bibl. 1, illus.

The transport of soft fruit in trucks containing dry ice is normal practice in the U.S.A. As a result of his visit with the Specialist Productivity Team to that country in 1951 [see *H.A.*, 23: 2501], R. F. Addey has attempted to adapt this principle of CO₂ injection to the farm storage of soft fruit in this country. In preliminary trials with black currants, raspberries and strawberries, cold storage in an atmosphere containing up to 20% CO₂ has given promising results. Black currants were held satisfactorily from 14 July to 15 August. The development of moulds was checked. There are indications that gas storage prior to marketing enables the fruit at the bottom of the basket to maintain its condition better.

218. CRANG, A., AND STURDY, M.

A comparison of some varieties of fruit preserved by bottling and by freezing. Progress report III.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 177-85, bibl. 4.

In contrast to the previous year [see *H.A.*, 22: 3481] comparisons in the 1952 season were restricted to fruit preserved by bottling and by freezing. The results are given of tasting tests on 3 varieties of blackberry, 2 of cherry, 3 of gooseberry, 13 of plum, gage or damson and 3 of strawberry, and on 3 species of citrus. The frozen fruit was again found to be generally superior in colour to the heat-processed fruit, but flavour varied too much to permit of generalization. Notes are given on the response of each variety to the two methods of processing.

Vines.

(See also 1, 9, 64, 82, 201b, 207, 244d, e, 1023.)

219. RICCI, A.

L'introduzione della viticoltura specializzata nelle "larghe ravennati". I. 5 anni di sperimentazione viticola presso l'Azienda Zootecnica Ravennate. (The introduction of specialized viticulture on the Ravenna flats. I. Five years of viticultural experiments at the Ravenna Zootechnical Farm.) [English summary $\frac{1}{2}$ p.] *Riv. Fruttic.*, 1953, 15: 227-48, illus.

The possibility of introducing specialized viticulture on the poor soils of the Ravenna flats is being investigated as part of a project for improving economic and social conditions in the area. The first 5 years' experiments at an experimental specialized vineyard are described. Notes are given on stock and scion varieties, methods of grafting and training, cultural practices and costs.

220. ZILLIG, H., AND OTHERS.

30 Jahre Institut für Weinbau der Biologischen Bundesanstalt. (Thirty years work of the Viticultural Institute of the Biologische Bundesanstalt, Berncastel.) Reprinted from *Rhein. Weintzg.*, 1951, 1: 54-7, 1952, 2: 5-8, 73-6, 80-8, illus.

The chief activities of the Berncastel-Kues Institute have been devoted to problems of plant protection, nutrition and soil science. Its director considers that recent improvement in wine quality is partly due to the development of plant protection on a biological basis with the resulting reduction in the quantity of chemicals applied. A bibliography of the more important papers published by the scientific staff of the Institute concludes the initial article. In separate articles, also included in the reprint, the following subjects are also considered: maintenance of fertility in the vineyard; pest and disease control; official testing of control materials; the red spider in the vineyard; and *Eriophyes vitis* in German vineyards.

221. ANON.

New Naples grape.

Amer. Nurserym., 1953, 98 (4): 41.

A new red grape named Naples has been introduced by Geneva, N.Y. It is similar to Delaware in colour and flavour but has a larger and looser cluster of fruit with larger berries and a tougher skin. It comes into season 2 weeks later than Delaware.

222. COSMO, I., AND COMUZZI, A.

Gli ibridi produttori diretti a Conegliano. (Hybrid direct producers at Conegliano.) [English summaries 12 and 3 lines.] *Ann. Sper. agrar.*, 1953, 7: 1019-57, 1445-84, bibl. 6, illus.

A first report on 206 hybrid direct producers at Conegliano was published in 1926. In 1936 a further report was published on 455, including the first 206; definite conclusions were drawn with regard to 322 of these which had been available for some years, but the other 133, at that time recently introduced, required further study. The present papers constitute a final report on 130 of these. The best 9 are 3 early white (Baco 2.16, Baco 37.16 and Seibel 8116), 3 midseason white (Seibel 5178, Seibel 8343 and Seibel 10.173) and 3 mid-

season black (Seibel 5455, Seibel 10.096 and Terzi 108-6). The principal plant and fruit characters of each variety are briefly described. Some general notes on the culture of hybrid direct producers are given.

223. BREIDER, H.

Entwicklungsgeschichtlich-genetische Studien über somatische Mutationen bei der Rebe. (*Ontogenetic and genetical studies on somatic mutations in the vine.*)

Züchter, 1953, 23: 208-22, bibl. 41, illus.

The paper is a contribution to the genetics of long-lived cultivated plants that are propagated vegetatively and have a high clone age. The structure of vine chimaeras arising from bud mutations is discussed in great detail. —Bayer. Landesanst. f. Wein-, Obst- u. Gartenbau, Würzburg.

224. NEGRULJ, A. M.

Vegetative variability in vines. [Russian.] *Agrobiologija*, 1951, No. 1, pp. 66-70, bibl. 2, illus.

Mutations due to environmental conditions, including changes in the colour of berries, flower characters, leaf shape, date of maturity, yield, and occurrence of seeds in seedless grapes and the reverse, are described with illustrations of some of the phenomena.

225. ANON.

Ist Maschinenveredeln überlegen? (A machine for vine grafting.)

Tech. Bauern Gärt. Ausg. G., 1953, 5: 199-200, illus.

A new model (RH 53) of the Austrian Hengl machine for grafting vines is described which employs the mortise and tenon joint technique. This grafting method is claimed to give a better union and a higher percentage of take than does the customary whip-and-tongue grafting. The technique and the machine are illustrated. The article is partly based on a fuller account by L. Moser which appeared in the Austrian journal *Die Landwirtschaft*, January 1953.

226. VIDAL, J.-P., AND ROCHE, R.

Les possibilités du paraffinage dans l'amélioration de la technique viticole. (The possibilities of paraffin-waxing [grafted plants] for the improvement of viticultural technique.)

Progr. agric. vitic., 1953, 140: 157-61 and 168-75, illus.

The paraffin-waxing technique employed at the School of Agriculture at Meknes in Morocco in 1952 is described. Scions of numerous varieties were either cleft- or mortise-grafted on rooted plants of R.99. The grafted plants were dipped to 3-4 cm. below the cuts in commercial paraffin wax (melting point 52-55° C.) at about 70° C. Percentage successes with dipped cleft-grafted and dipped mortise-grafted plants were 82-91 and 76-90 respectively.

227. DRAGAŠ, M., AND AVRAMOV, L.

Primena sintetičkih fitohormona za vegetativno razmnožavanje podloga vinove loze. II. (The use of synthetic plant hormones in the vegetative propagation of vine rootstocks. II.) [English summary 1½ pp.]

Zemlj. i Bilj., Belgrade, 1953, 2: 87-108, bibl. 18, illus.

In further trials [see also *H.A.*, 23: 3923] to test the effect of growth substances on the rooting of cuttings, 10 materials at 2 or 3 concentrations each were used. The work, for which a mass of data is presented, was carried out at 4 different places, and the treatments, all applied to the base of the cuttings, were of 24 hr, 30 min. or 2-3 sec. duration. Of the 3 rootstocks studied Chasselas × Berlandieri 41B responded, on the whole, best to the hormonal treatments, with Berlandieri × Riparia Kober 5BB second and Berlandieri × Riparia Teleky 8B third.

228. AGUIRRE, J. T., MARIÑO, E. F., AND FERNANDEZ-CANO, L. H.

Nuevos ensayos sobre la acción de hetero-auxinas en la multiplicación de la vid por estaca. (Further experiments with growth substances in vine propagation by cuttings.) [English summary 15 lines.]

Bol. Inst. Invest. agron. Madrid, 1953, 13 (28): 100-37, bibl. 16.

Experiments were undertaken in 1952 with 3 varieties difficult to root. 41-B de Millardet cuttings were treated with beta indoleacetic acid at 15, 25 and 50 mg./l. for 6 and 12 hours; the minimum dosage and shorter dip gave the best results (38.4% rooting compared with 31.4 in the control, but only a 2.7 kg. increase per 100 cuttings rooted after 12 months compared with 3.0). 161-49 de Couderc and 110 Richter were treated with indolebutyric acid and naphthaleneacetic acid respectively, both at 5, 15 and 25 mg./l. With 161-49 C. the best results were obtained with 15 mg./l. for 12 hours (28.8% rooting compared with 22.7 in the control, and 3.99 kg. increase compared with 3.61). With 110 R the best results were obtained with 25 mg./l. for 12 hours (76% rooting compared with 74, and 1.66 kg. increase compared with 1.65).—Centr. Ampel. Vitic., Madrid.

229. BURGESS, E.

Sunny Vale. A contour-planted vineyard at Watervale.

J. Dep. Agric. S. Aust., 1953, 57: 14-17.

An account of the planting of a vineyard on the contour in S. Australia on lines advised by the Department of Agriculture. It is now thriving in its 8th-10th year.

230. KNOCH, K.

Wo bleibt die Technik bei den Arbeiten im Weinberg? (Machines for the vineyard.)

Tech. Bauern Gärt. Ausg. G., 1953, 53: 380-3, illus.

LÖHR, L.

Mechanisierung der Weinbergarbeiten durch Motorseilzug. (A motor winch for use in the vineyard.)

Ibidem, 1953, 53: 427-9, 454-6, illus.

Several models of motor winch and their uses in steeply sloping vineyards are discussed and illustrated. The latest types incorporate electrical equipment for communication between the man on the plough and the operator of the winch.

231. EGGENBERGER, W.

Die Verwendbarkeit verschiedener Materialien für das Heften der Reben. (The use of different materials for tying vines.)

Schweiz. Z. Obst- u. Weinb., 1953, 62: 401-4, illus.

Two new mechanical devices for tying vines, a pistol and special pliers, are illustrated and compared with the Wädenswil ring, the use of which has become standard practice in Switzerland.

232. MÜLLNER, L.
Erfahrungen mit der Hochkultur. (Vine growing on a high trellis.) [English summaries 9 lines and 4 lines.]
Mitt. Klosterneuburg, 1953, 3: 140-4, bibl. 2, and 188-95, bibl. 8, illus.

The manifold advantages of growing vines in Austria on a high trellis are discussed. Recommendations are made for the trellising of staked, bearing vines.

233. VEGA, J., PIEDRABUENA, A. E., AND FOX, J. M.
Correlación entre superficie foliar y rendimiento como posible fundamento de una poda racional en vid (*Vitis vinifera* L.). (Relationship between leaf area and yield as a possible criterion in vine pruning.)
Rev. Fac. Cien. agrar. Mendoza, 1951, 3 (2): 1-17.

Further studies have confirmed previous conclusions [*H.A.*, 23: 2730] and shown a similar relationship between mean total area of the 5th leaves of primary fruiting shoots and weight of crop. A study of the relationship between pruning intensity, fruit yield, fruit sugar content and leaf area showed that, as pruning intensity (ranging from 3 to 60 buds) decreased, fruit yield and sugar content increased up to a certain point beyond which sugar content fell while yield continued to increase, the mean total area of the 6th leaves remaining in correlation with the yield throughout.

234. LE ROUX, M. S., AND MALAN, A. H.
Bearing characteristics of Alphonse Lavallée grapes.
Fmg S. Afr., 1953, 28: 283-4, 288, bibl. 3, illus.

Experiments were carried out at Bellevue, Paarl, in 1952-53 to determine the bearing habits of Alphonse Lavallée grapes pruned to a long bearer cane with 14 buds and two short, two-bud canes on both sides. Results indicated that although the fruitfulness of the shoots was not significantly affected by their position on the long canes, the quality of the grapes and the weight of the bunches were strikingly affected. The best grapes and the heaviest bunches were found on the top shoots of the long canes. J.S.

235. C.S.I.R.O., AUSTRALIA.
Commonwealth Research Station (Murray Irrigation Areas), Merbein, Victoria. Horticulture.
A.R. C.S.I.R.O., Aust., 1951/52, 1952, pp. 34-5.

Notes are given on the practice of microscopical examination of sultana vine canes in May to determine the percentage of dormant buds which will throw a fruitful shoot the following season. A pruning trial on sultanas, in which the chief variable was the number of canes, all equal in length, per vine, again showed increased yield with increased number of canes. Yield, of canes, all equal in length, per vine, again showed that yield increased with increased number of canes. Yield,

however, was not proportional to the number of canes; individual bunches were heavier on the vines carrying the smaller number of canes. Currant vines sprayed with 2,4-D [concentration not given] at the time they would be normally cinctured yielded slightly better than similar vines cinctured in the usual way. Other work reported on sultanas includes mealy bug studies; the relationship between salt status and yield; green manuring; and fertilizing.

236. WEAVER, R. J.
Further studies on effects of 4-chlorophenoxyacetic acid on development of Thompson Seedless and Black Corinth grapes.
Proc. Amer. Soc. hort. Sci., 1953, 61: 135-43, bibl. 9, illus.

Results of experiments in five counties of California are reported. Cluster and berry thinning, girdling of the canes, and spraying with 4-chlorophenoxyacetic acid (CPA) were done immediately after the normal drop of berries had occurred. In three of the five counties, applications of 5 to 15 p.p.m. CPA to Thompson Seedless grapes resulted in the development of berries as large as, or larger than, those produced by girdling alone. The largest berries were produced by combined girdling and spraying. A delay in spraying of more than a week produced little or no enlargement of the berries. Sprayed clusters had thicker pedicels with more firmly attached berries than unsprayed clusters. Black Corinth grapes sprayed with CPA at 10 p.p.m., 4 to 10 days after full bloom, usually produced acceptable clusters with few or no hard seeds. J.S.

Nuts.

(See also 5, 10, 128, 129, 153, 1028.)

237. CRESCIMANNO, F. G.
Contributo allo studio di alcune varietà di mandorlo coltivate in Sicilia. (Contribution to the study of some varieties of almond grown in Sicily.) [English summary 5 lines.]
Riv. Ortoflorofruttic. ital., 1953, 37: 71-81, bibl. 14, illus.

Notes are given on the habit, leaf, flower, fruit and seed characters and physiology of 10 varieties (some of them exported as shelled almonds) cultivated in the Canicatti district of Sicily. The best are the semi-hard-shelled Insulaca and Sancisuca and the soft-shelled Casteltermini. Propagation is by grafting in the open on bitter or sweet almond rootstock varieties in the 2nd or 3rd year after planting out.

238. ARRICA, N. N.
Le mandorle. (The almond [in Sardinia].)
Ortofrutticoltura in Sardegna, 1953, pp. 111-15.

Almonds are an important crop in Sardinia and are grown both on smallholdings in the hills and as a specialized crop in coastal valleys. In addition to certain local varieties the following are worthy of wider cultivation: Romana grossa, Molise, Francese, Rapparina dolce and the so-called Nocciolara. Production is 75-90 thousand quintals a year.

239. MCKAY, J. W., AND CRANE, H. L.
Chinese chestnut—a promising new orchard crop.
Econ. Bot., 1953, 7: 228-42, bibl. 18, illus.

Castanea mollissima: description, uses, soil and climatic requirements, orchard management and cultural practices, varieties, propagation, harvesting and storage, yields, pests and diseases of this blight-resistant species.

240. PEASE, R. W.

Rooting chestnuts from softwood cuttings.

Nat. hort. Mag., 1953, 32: 259-64, bibl. 8, illus.

In trials in 1950 at the West Virginia Agricultural Experiment Station with Chinese chestnuts (*Castanea mollissima*) small batches of well-hardened softwood cuttings taken between June and August showed 66% to 100% rooting in 70 days, when first soaked for 24 hrs in an aqueous solution containing 40 to 70 p.p.m. indolebutyric acid, and placed in sand over sphagnum in an insulated rooting chamber with controlled soil and air temperatures of 70° F. and 65° F. respectively, fluorescent lighting, and humidity maintained by fog nozzles. Cuttings not treated with hormone or treated with hormone in talc did not root. In 1952 a few similar cuttings taken in August of Chinese chestnut and American chestnut (*C. dentata*) showed about 50% and 20% rooting respectively after 70 days when set in sand in electrically heated outdoor frames supplied with fog nozzles. Further investigations will be necessary before any recommendations can be made.

241. HONDA, N., OKAZAKI, M., AND OTSUKA, S.

Root development of chestnut trees in relation to edaphic conditions. (II) On the observations of chestnut trees in Aida Gun, Okayama Prefecture.

J. hort. Ass. Japan, 1953, 22: 107-12, bibl. 11, illus.

Gravelly and stony soils suit *Castanea crenata* but soil pan impedes its root development.

242. ALBEN, A. O., AND OTHERS.

Comparative growth and yield of Stuart, Success and Schley pecan varieties.

Proc. Amer. Soc. hort. Sci., 1953, 61: 307-10.

Eighteen years after planting, Stuart trees were larger than Success and Schley trees. Success and Schley varieties came into production earlier than Stuart. The yield of the Success was higher than that of the Stuart and the yield of the Stuart was higher than that of the Schley. The yield of the Success was relatively higher

under adverse as compared with favorable conditions than either Stuart or Schley. The quality of the Success nuts was poorer and more erratic than that of Stuart or Schley nuts. [Authors' summary.]

243. JOLEY, L. E., AND WHITEHOUSE, W. E.

Root knot nematode susceptibility—a factor in the selection of pistachio rootstocks.

Proc. Amer. Soc. hort. Sci., 1953, 61: 99-102, bibl. 2, illus.

Root knot nematode, *Meloidogyne* sp., was found for the first time on the roots of pistachio seedlings at Chico, California, in 1944 and again in 1952. Seedling progeny of *Pistacia vera* and *P. vera* × *P. terebinthus* were the least resistant. Those of *P. atlantica*, *P. chinensis*, *P. integerrima* and *P. mutica* parentage were highly blight-resistant. J.S.

Noted.

244.

a CUMBERLAND, R.

Cultivating perpetual strawberries.

Grower, 1953, 40: 399-40, illus.

b FULLER, C. E. K., AND YATES, R. E.

Propagation of strawberry plants in Waikato and Coromandel areas [of New Zealand].

N.Z. J. Agric., 1953, 87: 23-9, bibl. 2, illus. Methods used for disease and pest control.

c GERRITSEN, J. D., DE BIJL, D., AND BLOMMERS, J.

De teelt van aardbeien in België. (Strawberry cultivation in Belgium.) [English summary 7 lines.]

Meded. Dir. Tuinb., 1953, 16: 731-6, illus.

d MANZONI, L.

Formazione e struttura degli organi florali. Impollinazione e fecondazione. (Formation and structure of the floral organs [in the vine]. Pollination and fertilization.)

Riv. Vitic. Enol., 1953, 6: 195-207, bibl. 13, illus.

e MAVEROFF, A.

Der Weinbau in Argentinien. (Vine growing in Argentina.) [English summary 6 lines.]

Mitt. Klosterneuburg, 1953, 3: 179-83.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(See also 80h, 220, 372e, f, 387-391, 404c, 611, 1028, 1044, 1046, 1056.)

245. DOIDGE, E. M., AND OTHERS.

A revised list of plant diseases in South Africa.

Sci. Bull. Dep. Agric. S. Afr. 346, being *Bot. Pl. Path. Ser.* 16, 1953, pp. 122, 1s. 6d.

Previous lists were published in 1924 and 1931. In the present list the diseases, which appear in the index under their scientific names, will be found under the common names of the plants attacked, e.g. *Gloeosporium amygdalinum* appears under Almond, anthracnose, gummosis of fruit. In many cases very brief notes are given on the phenomena caused and the incidence

of the particular disease. Viruses and non-parasitic troubles such as delayed foliation are included.

246. MINISTER OF AGRICULTURE, CANADA.

Tree fruits.

A.R. Canada Minist. Agric. 1952/53, 1953, pp. 34-8.

Apple scab: Fungicides applied successfully in various provinces are listed. *Apple crown rot*: An evaluation was made of *Phytophthora cactorum* susceptibility of apple seedlings arising from crosses between resistant and susceptible varieties. Disease ratings were calculated by placing maximum susceptibility at 100 and maximum resistance at 0. The rating obtained for plants with susceptible parents was 87; for those with one parent susceptible and one resistant 19;

and for those with both parents resistant, 5. *Codling moth*: In British Columbia a 50% water suspension of DDT gave as good control as the wettable powder and was much less abrasive to concentrate sprayers. *Orchard Mites*: Among materials applied at the pink stage on apples in British Columbia systox gave the best control of both the European red mite and the clover mite. *Physiological disorders*: Good control of "leaf blotch", due to magnesium deficiency, was obtained when 4 or more sprays of magnesium sulphate (2% solution) were applied to affected trees during the latter part of June or July.

247. MINISTER OF AGRICULTURE, CANADA.

Small fruits.

A.R. Canada Minist. Agric. 1952/53, 1953, pp. 38-9.

Strawberry diseases: Verticillium wilt was found in strawberry fields in Nova Scotia during 1952 for the first time. Notes are given on virus studies. *Raspberry, blackberry and loganberry diseases*: A decline in loganberry plantations was found to be due to 3 diseases, root-rot, cane gall, and crown gall. Two virus diseases are recognized on Himalaya blackberry; one, as yet unidentified, is serious, the other, aucuba mosaic, is of minor importance. Various viruses and a case of manganese deficiency are reported for raspberries. *Currant pests*: In tests of spray schedules for the simultaneous protection of currants against the currant fly, mites and diseases, sprays of DDT and lime-sulphur, of DDT and glyoxalidine, and of DDT, bordeaux and ovotran gave very good results.

248. SOCIETY OF CHEMICAL INDUSTRY (POLLARD, A. G.).

Control of pests.

Reps Progr. appl. Chem., 1952, 1953, 37: 253-94, bibl. numerous.

The report includes reviews of recent literature on the following. *Agricultural fungicides* (W. H. Read and R. J. Smith), pp. 254-63, bibl. 35, dealing with orchard fungicides, systemic fungicides, antibiotics and fungicidal action. *Agricultural acaricides* (A. H. M. Kirby and R. P. Tew), pp. 263-76, bibl. 82, being almost entirely devoted to organic compounds with special reference to their action against summer eggs of spider mites. *Control of plant nematodes* (Peters, B. G.), pp. 276-9, bibl. 52.

249. UNRUH, M.

Warndienst im Pflanzenschutz. (Warning service for pests and diseases.) [English summary 6 lines.]

Z. PflKrankh., 1953, 60: 449-63, bibl. 50.

Warning services already established, though far from satisfactory, have worked sufficiently well to warrant further research which would improve accuracy in disease and pest forecasting. The position in Germany is discussed with many references to the literature.

Disturbances of nutrition or of unknown origin.
(See also 47, 51, 199.)

250. CIFERRI, R.

Complessità dello studio delle malattie da carenza nelle piante fruttifere arboree. (The complexity of the study of deficiency diseases in fruit trees.)

Humus, 1953, 9 (6/7): 42-5.

Brief general notes. In a table an approximate comparison is given of the average B, Cu, Mn, Mo, Zn and Fe contents of agricultural soils (available ions), mineral nutrient solutions, plant tissues (including citrus and other fruits, and beverage, aromatic, medicinal and other plants) and animal tissues.

251. MCGEORGE, W. T.

A study of lime-induced chlorosis in Arizona orchards.

Tech. Bull. Ariz. agric. Exp. Stat. 117, 1949, pp. 341-88, bibl. 39, illus.

Observations made in Arizona are detailed and the position is discussed. Recommended corrective measures for lime-induced chlorosis of citrus and deciduous fruit trees are: improvement of drainage; correct irrigation; cover cropping or mulching; use of acid soil correctives; and application of micro-nutrients either by tree injection or by foliage spraying. [See also H.A., 20: 660.]

252. LOCKE, L. F.

Chlorosis experiments.

Proc. Amer. Soc. hort. Sci., 1953, 61: 77-83, bibl. 5, illus.

Mulches with and without ferrous sulphate, sprays of ferrous sulphate, of zinc sulphate and of lime alone and with zinc sulphate, and soil treatments with sulphur, zinc sulphate, ferrous sulphate and four other sulphates were tested to correct lime-induced chlorosis on grape vines. Though initially showing an improvement, most of the mulched vines died eventually. Ferrous sulphate was the only effective spray, but 8 or more sprayings were usually required each year. Ferrous sulphate was also the most effective soil treatment and applications of 5 lb. per vine were effective for about 10 years. Results were obtained sooner when ferrous sulphate was used in solution than when used dry. In solution, 5 to 60 lb. per vine was not injurious to the plants. Ferrous sulphate was also effective when applied to spirea, and, almost without exception, 120 other varieties or species benefited by treatment with it, provided they were not too badly damaged by chlorosis before treatment. J.S.

253. CIFERRI, R.

Disorders of fruit trees due to boron deficiency and other causes in Northern Italy.

FAO Plant Prot. Bull., 1953, 1: 168-70.

Symptoms of boron deficiency in Italy are discussed in so far as they affect olive, apple, and prune and peach trees. In few cases are they clearly and unmistakably defined. *Olive*. Symptoms associated with boron deficiency in northern Italy include sharply defined chlorosis in the distal half or third of the leaf which persistently hangs on the twig. The foliage is sparse, poorly developed and often rosetted. New growth is dwarfed, fasciculate but profuse. Larger branches and trunk become blistered with brown necrotic phloem. Productivity is greatly reduced. Remedy 1 lb. borax to soil round affected tree or boric acid injection. *Apple*. Chronic deficiency is characterized, especially in spring, by atrophy or death of buds, deformation and fall of young leaves, phloem necrosis and blistering on branches. The twigs then die back from the leafless tips and show brown discoloration in the fibro-vascular bundles. Excessive growth from below the dead part

gives rise to foliar rosetting. Remedy 1 lb. borax to soil round tree in earlier stages. *Prune and peach*. A shrivelling of buds, cambial necrosis, bark blisters and gummosis may be due to boron deficiency.

254. BOULD, C., AND OTHERS.

Copper deficiency of fruit trees in Great Britain.

J. hort. Sci., 1953, **28**: 268-77, bibl. 17, illus.

Copper deficiency symptoms in apple and pear [in some sandy soils in southern England] are described and illustrated. The threshold copper level in apple and pear leaves, associated with the onset of visual symptoms, is $<5\mu\text{g.}$ per g. dry matter (p.p.m.). Soils providing adequate copper for fruit trees give values of $>2\mu\text{g.}$ of available copper per g. of air-dry soil, as determined by the *Aspergillus niger* method. Copper deficiency in fruit trees was corrected by applications of copper sulphate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ as follows: (a) to the soil at the rate of $\frac{1}{2}$ lb. per tree, (b) by 4% dormant sprays, (c) foliage sprays (0.05%) and (d) by branch or trunk injections. Response to treatment was not always accompanied by an increase in the copper content of the leaves, expressed as a percentage of dry matter. [Authors' summary.]

255. SUGIYAMA, T., IWATA, M., AND YASHIRO, H.

Magnesium deficiency in grapes. [Japanese.]

J. hort. Ass. Japan, 1952, **21**: 161-4, bibl. 16, illus.

Chlorotic foliar patterns were observed in the summer of 1951 on grape vines in many districts of the Yamana-shi Prefecture. The Mg concentration in chlorotic grape leaves collected in late August was found to be from 0.05 to 0.25% compared with levels of 0.27 to 0.50% in normal healthy leaves. Soil analyses revealed that the soil under chlorotic vines was low in available Mg, showing values for exchangeable Mg of less than 1 m.e., but among soil samples collected under healthy vines there were also some which showed values for exchangeable Mg as low as, or even lower than, those found in the soil under chlorotic vines. The soils of vineyards where chlorosis of this kind occurs are generally light, sandy and relatively high in exchangeable K. Y.A.

256. SHARPE, R. H., BLACKMON, G. H., AND GAMMON, N., Jr.

Magnesium deficiency of pecans.

Proc. 44th annu. Conv. Southeast. Pecan Grs Ass., 1951, pp. 23-7, from abstr. in *Fruits d'Outre Mer*, 1953, **8** (7), *Suppl. Fruits trop. sub trop.*, No. 10-5222.

Mg deficiency in the pecan, of which the symptoms are described, manifests itself when leaf Mg is less than 0.15-0.2% and can be cured by Mg fertilization.

257. BOULD, C., AND OTHERS.

Zinc deficiency of fruit trees in Great Britain.

J. hort. Sci., 1953, **28**: 260-7, bibl. 18, illus.

The authors describe and illustrate their experiments at Wisley, where the soil is very low in available zinc, which may have been further reduced recently by the application of limestone, and at other centres in southern England as follows. The threshold level for zinc in apple leaves and bark, coinciding with the onset of visual symptoms, is about $10\mu\text{g.}$ Zn per g. dry

matter. Severely affected leaves contain less than $5\mu\text{g.}$ Zn per g. dry matter. Normal soils contain more than $10\mu\text{g.}$ of available Zn per g. air-dry soil as determined by the *Aspergillus niger* method. Soils containing less than $2\mu\text{g.}$ of available Zn per g. air-dry soil will induce deficiency symptoms in fruit trees. Zinc deficiency in fruit trees may be corrected by foliage sprays of 0.1% zinc sulphate at petal-fall, or by 4 to 5% zinc sulphate sprays during the dormant season.

258. MANARESI, A.

La stanchezza del terreno nei vivai di piante legnose. (Soil sickness in tree nurseries.)

Ital. agric., 1953, **90**: 477-92.

Observations on about 100 fruit, ornamental and other species conducted over more than 20 years have led to the following conclusions regarding soil sickness in tree nurseries: (1) almost every species exhausts the soil to some extent and cannot be followed by itself; mulberry and tilia are among the least sensitive; species more sensitive to others than to themselves include hawthorn, sweet cherry (which for example grows very poorly after peach, apricot and myrobalan), sour cherry, quince, *Ligustrum japonicum* and *Diospyros lotus*; (2) seeds sown in sick soil are very prone to die during germination and in the first few months of growth; (3) the transplanting of sensitive species into sick soil results in considerable loss; (4) plants in sick soil grow slowly and stop growth abnormally early; (5) one-year-old plants raised in sick soil and then transplanted into healthy soil return to normal growth in 1-2 years; if left in sick soil, they improve in the second year and almost always become normal in the third as their roots reach healthy soil below the sick horizons; (6) in sandy soils sickness is often unknown whereas in clay soils it may persist for many years; (7) sometimes only the narrowest margin separates areas of sick and healthy soil in the nursery. The cause of soil sickness is discussed. The characteristics of the following species and some ornamentals grown on sick soil are discussed in some detail: sweet and acid cherry, quince, mulberry, trifoliate orange, *Diospyros lotus*, mahaleb, almond, *Malus communis*, myrobalan, walnut and peach.

259. HOUTMAN, G.

Vergroeiingen van vruchten. (Abnormal fruit development.)

Fruittelt, 1953, **43**: 268-9, 304-5, 652-3, 682-3, illus.

In this series of 4* articles the author describes and illustrates various curious malformations of the fruits of cherries, plums, pears and apples that he has observed personally. Among the malformations described are double and treble fruits joined in various ways, fruits out of which shoots or leaves have grown, parthenocarpic fruits and fruits developing from various vegetative organs.

260. BUSSCHOTS, —.

Une nouvelle maladie sur Cox. (Nécrose de l'écorce.) (A new disease of Cox, bark necrosis.)

Fruit belge, 1953, **21**: 161.

The symptoms of this serious new disease, first observed

* N.B.—Note that No. 3 was erroneously cited by us under Hoorn, G. H., in *H.A.*, 23: 3968.

in 1952, are swelling and breakdown of the bark a little above the graft union and, in serious cases, premature leaf fall. Incidence reached 20% in some orchards. The cause is not yet known, but *Didymella* spores have been observed in some specimens.

Climatic factors.

(See also 43, 791, 113, 139, 140, 1042.)

261. OLDÉN, E. J.

Frostskador hos körsbärsträdens blommor.

(Frost damage to cherry blossom.)

Fruktodlaren, 1953, pp. 108-10, illus.

Although the winter of 1952/53 was not particularly severe—the lowest temperature recorded at Balsgård was -20°C . in February 1953—it became evident in spring that many of the cherry flowers had been damaged in the bud stage, probably during the cold spell in February. Absence of the pistil or injuries to it were the most common symptoms observed. It is estimated that at Balsgård 26% of the flowers were affected by winter frost damage and that spring frost took a further toll of 13%. Varietal reactions are noted.

262. TUNBLAD, B.

Något om frostsador på bladverk och kart hos fruktträd. (Spring frost injuries to the leaves and young fruits of fruit trees.)

Växtskyddsnotiser, 1953, pp. 17-21, illus.

In addition to the common types of spring frost damage to fruit trees affecting blossom and young fruits, injuries to the foliage are described and illustrated. The latter were frequently observed in southern Sweden during the spring of 1953.

263. JENNY, J.

Die bei den Pflanzen sich einstellende Temperatur, die Temperatur in Bodennähe und die Frostbekämpfung. (Plant temperature, temperature near ground level and frost protection.)

Schweiz. Gärtnerztg, 1953, 56 (37): 2-4.

Temperature records are tabulated for (1) buds and branches of fruit trees, (2) the microclimatic zone near the soil, and (3) buds of fruit trees as affected by sprinkler irrigation. Further data are presented on the insolation (in $\text{cal./m}^2\text{/min.}$) of apple, vine, walnut, strawberry, raspberry and other leaves. Frost protection by irrigation is briefly discussed.—Lausanne.

264. VAN EIMERN, J., AND LOEWEL, E. L.

Haben die Wassergräben in der Marsch des Alten Landes eine Bedeutung für den Frostschutz? (The frost protection value of the drainage ditches in the marsh of the Altenland.)

Mitt. ObstbVersuchsrings Jork, 1953, 8: 225-31, bibl. 1.

Extensive records show that the water in individual drainage ditches modifies the microclimate in the immediately adjacent zone to a very small extent. The whole network of ditches, however, appears to extend the beneficial influence of the lower Elbe to a wide area. This may be a contributory factor in the relative freedom from spring frost in the orchards of the Altenland. Cutting the grass under the trees before and during blossom is considered as good a protective measure as raising the water level in the larger ditches.

265. STRAJIN-TOMIĆ, B., AND ŽULJEVIĆ, I.
Preliminary trial of stoves for frost control.
[Serbian, with English summary $\frac{1}{2}$ p.]
Zasht. Bilja, Belgrade, 1953, No. 18, pp. 87-94.

In trials carried out at Sremski Karlovci from 10 to 20 March, 1952, with 4 domestic type stoves burning sawdust and set 6×5 m. apart, the orchard temperature at the height of 1 m. was increased by 0.75°C . and at 2.5 m. by 1.5°C .

266. BÖMEKE, H.

Über das Schrumpfen der Zwetschen am Baume. (On the shrivelling of zwetschen on the trees.)

Mitt. ObstbVersuchsrings Jork, 1953, 8: 212-13, illus.

A drought in mid-August, combined with high temperatures, caused shrivelling of zwetschen fruits on the trees, especially at the stem end. The injury proved irreversible when plenty of rain water was again available, probably because the conducting vessels had ceased to function.

267. BARGIONI, G.

Conseguenze dell'alluvione del Reno nelle piante da frutto. (The effects of the Reno floods on fruit trees.)

Agric. ferrarese, 1952, 56 (1): 6-11, from abstr. in *Not. Mal. Piante*, 1953, No. 23, pp. 44-5.

GHERI, F., AND BARGIONI, G.

Danni da alluvioni su piante da frutto. (Flood damage to fruit trees.)

Gen. rur., 1953, 16 (3): 1-6, from abstr. in *Not. Mal. Piante*, 1953, No. 23, p. 53.

Inspection of a Ferrara orchard showed that the flood effects on apple trees were either (1) prolonged dormancy and slow growth flush followed by more or less normal growth; or (2) rapid growth flush but withering of almost all the petals and leaves, growth slow early in the season but more or less normal from June onwards; or (3) growth flush as in (2) but followed by an immediate stoppage of growth, flower drop and death of young shoots, this occurring several times before continuous growth began in June. This variable behaviour is attributed to the different reactions of different rootstocks. Permeability of horizons near the surface was a more important factor than duration of submersion. Injury to apple trees was negligible when the impermeable clay horizons were at a depth greater than 0.9 m., the mean maximum depth of the roots. The data in the second paper are taken from the first.

268. MINERBI, G.

Consigli ai frutticultori colpiti dall'alluvione. (Advice to owners of flooded orchards.)

Gaz. pad., 2 April, 1951, pp. 1-7, from abstr. in *Not. Mal. Piante*, 1953, No. 23, p. 56.

No winter pruning or spraying; shallow cultivation and inter-row sowing of a spring-summer grass; summer pruning; thinning of all undersized fruit; and NPK fertilization.

269. SIEGELMAN, H. W.

Brown discoloration and shrivel of cherry stems.

Proc. Amer. Soc. hort. Sci., 1953, 61: 265-9, bibl. 4, illus.

An investigation was made into the cause and cure of browning and shrivelling of cherry stems after picking. The browning reaction is enzyme-catalysed and is due to injury. Shrivelling is due to moisture loss which is directly related to temperature and humidity. Bruising accelerates moisture loss. Wax and 2,4-D were not effective in preventing either browning or shrivelling.
J.S.

Viruses.

(See also 372h, o, t, z, 564, 572.)

270. VAN KATWIJK, W.
Virusziekten in de vruchtboomkwekerij.
(Virus diseases in the fruit nursery.)
Meded. PI Ziekt. Dienst 199, 1953, pp. 27, illus.

To assist nurserymen in selecting only healthy wood for propagating purposes, descriptions and illustrations are here given of the virus diseases of pome, stone and berry fruits (excluding strawberries).

271. MILLIKAN, D. F.
The influence of the ring spot virus on growth of one-year-old sweet cherry nursery trees.
From abstr. in *Phytopathology*, 1953, 43: 480.

Field observations on 1-year-old nursery trees propagated from infected and ring-spot-free sources indicated that ring spot virus is a factor in growth inhibition of sweet cherry. Figures are given for 2 varieties. Greatest differences for both varieties appeared to be during the June-July period of the growing season.

272. PARKER, K. G., AND KLOS, E. J.
Green ring mottle virus reduces quality of sour cherry fruit.
From abstr. in *Phytopathology*, 1953, 43: 481.

Inoculation studies are reported on Montmorency, English Morello and Napoleon sweet cherry. Field surveys indicate that orchard spread occurs; the disease appears to be of considerable importance, particularly in the English Morello variety.

273. PAUNOVIĆ, S.
Mosaic disease of some peach varieties.
[Serbian, with English summary $\frac{1}{2}$ p.]
Zasht. Bilja, Belgrade, 1953, No. 18, pp. 49-54, bibl. 10.

Peach mosaic was reported for the first time from the Institute of Fruit Production at Čačak and the Union of Agricultural Co-operatives at Lipnica in 1952. Out of the 150 varieties grown, only 4, La France, Large Baden, Gripenkerl and Chinese Flat, were affected. Descriptions are given of 2 types of leaf symptom. No visible symptoms were observed on the fruit, though the quality, particularly of La France and Large Baden, was adversely affected by the disease.

274. O'REILLY, H. J.
Physiological changes induced in peach foliage by the western X disease virus.
From abstr. in *Phytopathology*, 1953, 43: 481.

In peach foliage infected with the western X disease virus, respiration rates, starch content, and nitrogen

content were determined. Diseased leaves respired more rapidly than healthy ones, the rate increasing as symptoms became more severe. The increase occurred when determined on a fresh weight basis and on a total nitrogen basis. Foliar starch accumulation increased with disease severity, but total nitrogen content was lower than in healthy foliage and did not vary as the disease advanced. The data on respiration, starch accumulation, and decrease in nitrogen all add to the evidence that the western X disease virus should be classified with the yellows group of viruses.

275. DE FLUITER, H. J., AND VAN DER MEER, F. A.
Rubus stunt, a leafhopper-borne virus disease.
Tijdschr. PI Ziekt, 1953, 59: 195-7, bibl. 6, illus.

The virus disease rubus stunt [see *H.A.*, 21: 1452] has since 1945 become increasingly prevalent in the Netherlands on raspberries. It has also been observed on wild raspberries and blackberries. In studies to discover the vector responsible for its transmission, positive results were obtained with the leafhopper *Macropsis fuscula*. No transmission was obtained in tests with other leafhoppers or with *Aphis idaei* or *Amphorophora rubi*.—Inst. PI Ziektenk. Onderz., Wageningen.

276. MARCUS, C. P., JR., AND MILLER, P. W.
Summary of the search for virus-free plants of strawberry varieties.
Plant Dis. Repr., 1953, 37: 90-1.

Indexing work at Beltsville, Md, and Corvallis, Ore., has so far revealed virus-free plants of 40 strawberry varieties which together comprise about 96% of the U.S. strawberry acreage. Thirteen varieties are listed of which no virus-free material has yet been found.

277. FULTON, R. H.
Effect of heat treatment on the type 2 virus present in the Robinson strawberry.
Plant Dis. Repr., 1952, 36: 466-7, bibl. 1.

Investigations on the hot water treatment of Robinson strawberry plants showed that the maximum sub-lethal temperature was 48° C. for an exposure of 10 mins. At this temperature there was no inactivation of virus type 2.

278. STELLWAAG, F.
Stand der Kenntnisse über die Reisigkrankheit der Rebe. (Our present knowledge of the court-noué disease of vine.)
NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, 5: 101-6, bibl. 35, illus.

The German literature on symptoms, transmission and nature of the court noué disease of vine is reviewed. The author inclines to the view that the cause of the trouble is ecological rather than pathogenic.

279. GALLAY, R., AND OTHERS.
Une méthode d'évaluation mathématique du court-noué. (The mathematical evaluation of court-noué.)
Landw. Jb. Schweiz, 1953, 2 (n.s.): 945-52, bibl. 4, illus.

The authors propose a formula expressing the degree of irregularity in the internodes of vine shoots and discuss its application in the diagnosis of court-noué in the field.—Lausanne.

Bacteria.

(See also 111, 298, 372a, 1.)

280. HEUBERGER, J. W., AND POULOS, P. L.
Control of fire blight and frog-eye leaf spot (black rot) diseases of apples in Delaware in 1952.
Trans. Peninsula hort. Soc., 1952, **42** (5): 53-6, bibl. 4, and *Plant Dis. Repr.*, 1953, **37**: 81-3, bibl. 4, being *Misc. Pap. Del. agric. Exp. Stat.* **169**.

In spraying trials against severe attacks of both frog-eye spot (*Phylospora obtusa*) and fire blight (*Erwinia amylovora*) on Starr apples the zinc ethylene bis dithiocarbamate fungicides, dithane Z-78 and parzate, and the manganese ethylene bis dithiocarbamate fungicide, manzate, gave highly effective control of both organisms. Among antibiotics thiolutin at 120 p.p.m. gave significant control of both diseases, streptomycin sulphate at 120, 60 and 30 p.p.m. gave significant control of fire blight but not of frog-eye, and terramycin and copper rimocidin were ineffective.

281. DUNEGAN, J. C.
New information on the overwintering of the peach bacterial spot organism.
Trans. Peninsula hort. Soc., 1952, **42** (5): 52-3, bibl. 4.

Autumn infection of peach twigs by *Xanthomonas pruni* can be prevented by spraying to interrupt the cycle of infection from one season to the next. [No specific recommendations are made for the treatment in autumn.]

282. ANDERSON, H. W.
Control of bacterial spot of peach.
Trans. Ill. St. hort. Soc. for 1952, 1953, **86**: 218-28.

In trials in Arkansas and Illinois, copper sulphate applied at 4 lb. per 100 gal. in the middle of October or when the first leaves began to drop gave very promising control of bacterial spot [*Xanthomonas pruni*] on peach. Treatments should be applied during dry weather and at low humidity. If a lime safener is used it should follow the copper sulphate within an hour but not before the copper spray has dried on the twigs.

Fungi.

(See also 201s, 204, 208, 260, 372p, s, u, 373a, b, c.)

283. WEAVER, L. O.
Botryosphaeria rot of apple in Maryland.
Trans. Peninsula hort. Soc., 1952, **42** (5): 66-7, bibl. 14, and abstr. in *Phytopathology*, 1953, **43**: 407, being *Misc. Contr. Md agric. Exp. Stat.* **152**.

A description is given of the symptoms of an apple fruit rot due to *Botryosphaeria ribis* which caused considerable pre- and post-harvest losses in Maryland in 1952. The most susceptible varieties were Golden Delicious, Rome Beauty, Grimes and Northwestern Greening.

284. SMITH, H. C.
Collar rot of apple trees in Essex.
Plant Path., 1953, **2**: 85-6, bibl. 4.

Collar rot of apple trees in Essex was found to be caused by the fungus *Phytophthora cactorum*. This appears to be the first record of the disease attacking the bark of apple trees in England, although it is known to occur in America and New Zealand and it has been recorded as causing rotting of apple fruits in this country. The symptoms of the disease are described. J.S.

285. SHAY, J. R., AND WILLIAMS, E. B.
Physiologic specialization in *Venturia inaequalis*.
 From abstr. in *Phytopathology*, 1953, **43**: 483-4.

About 30 clones representing 14 species of *Malus* have been found to be resistant to all strains of *Venturia inaequalis* tested from Illinois and Indiana, and from Australia, England, Germany, Norway and Yugoslavia.

286. STANTON, W. R.
Field variation in *Venturia pirina*.
Trans. Brit. mycol. Soc., 1953, **36**: 90-103, bibl. 34, illus.

No correlation was found in England between different types of the pear scab fungus and the host varieties from which they originated, nor did variation among isolates appear to be clearly related to geography as in Germany [From author's summary.]

287. PLASMAN, A.
 Influence de pulvérisations automnales sur la formation des périthèces de *Venturia inaequalis* (Cooke) Winter et de *V. pirina* Aderh. (The effect of autumn spraying on the formation of *Venturia inaequalis* and *V. pirina* perithecia.)
Parasitica, 1953, **9**: 105-17, bibl. 28.

Spraying apples and pears with ammonium DNOC (1.6%) in autumn, before leaf fall, reduced the formation of scab perithecia on the foliage to practically nil. The results obtained by this method were thus superior to those claimed for ground treatment in the U.S.A. It is expected that autumn applications will prove effective also against other forms of hibernating *Venturia* spores, though this remains to be tested. The trials, which were carried out with several chemicals at several concentrations, showed that fungicidal action was related to phytocidal action.

288. MÜLLER, R.
 Apfelmehltau und Apfelschorf. (Apple mildew and apple scab.)
Mitt. ObstbVersuchsrings Jork, 1953, **8**: 249-56, bibl. 4, illus.

The infection of apple trees by mildew is discussed and compared with scab infection. Some data on mildew control by wettable sulphur preparations, with and without spreader, are presented and the importance of cultural measures to ensure vigorous tree growth is emphasized. Sprays applied before 20 May had no protective value.

289. PALMITER, D. H., AND EMERSON, F. H.
Results of 1952 tests with fungicide mixture for the control of apple scab and quince rust.
Plant Dis. Repr., 1953, **37**: 11-13, being *J. Pap. N. Y. St. agric. Exp. Stat.* **915**.

The results of earlier tests of mixtures of eradicant and protectant fungicides for the combined control of apple scab (*Venturia inaequalis*) and cedar-apple or quince rust (*Gymnosporangium juniperi-virginianae* and *G. clavipes*) on apples were in general confirmed in 1952. Phygon-fermate mixtures gave much better results than phygon-sulphur combinations. Fermate-mercury mixtures were effective and did little injury when confined to early season applications. Crag-mercury failed to control rusts. Fungicide 406 showed both protectant and eradicant properties and deserved further trial. [See also *H.A.*, 23: 2819.]

290. WADE, G. C., AND WARD, J. R.

Black spot of apples and pears.

MILLER, L. W.

Effects of certain new fungicides on the European red mite in Tasmanian apple orchards.

Tasm. J. Agric., 1953, 24: 197-208, bibl. 4, and 209-12, bibl. 1, illus.

In investigations in 1951-52 and 1952-53 on the control of *Venturia inaequalis* in apple and *V. pirina* in pear in Tasmania TMTD gave the best results but, like SR 406, permitted an increase in the mite population. Much earlier application (late December or early January) of acaricide foliage sprays such as parathion is therefore recommended.

291. BYRDE, R. J. W., AND FIELDING, A. H.

Spraying experiments against apple and pear scab at Long Ashton, 1952.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 103-9, bibl. 5.

On Worcester Pearmain apples at Long Ashton in 1952, the level of scab control obtained by three applications of lime-sulphur was approximately equalled by that following three applications of phenyl mercury acetate and phenyl mercury chloride at 0.0032% Hg. An organo-mercury sulphonate material at the same concentration of mercury proved relatively ineffective. Trichloromethylthio-tetrahydrophthalimide (0.2% of a 50% preparation) proved the equal of lime-sulphur in scab control on Worcester Pearmain and Cox's Orange Pippin apples, and resulted in a significantly greater crop per tree on the latter variety. In another experiment on Cox's Orange Pippin, similar results were obtained from the use of heptadecyl glyoxalidine (0.375% of a 34% preparation). There was significantly less apple mildew (caused by *Podosphaera leucotricha*) on plots which had received lime-sulphur during the past three years than on those where it had been omitted or replaced by glyoxalidine sprays. No loss of crop followed the use of phenyl mercury chloride or the phthalimide spray on Lane's Prince Albert and Stirling Castle apples, or that of heptadecyl glyoxalidine or the phthalimide on Doyenné du Comice pears. [Authors' summary.]

292. KEARNS, H. G. H., MARSH, R. W., AND MORGAN, N. G.

Spray application problems: IV. Preliminary field experiments on the control of apple scab by small-volume sprays.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 90-5, bibl. 4, illus.

Two trials are reported: (a) a comparison on Worcester Pearmain between conventional spraying with 1% lime-sulphur (l.s.) and "air-flow" spraying with 2% l.s. at half volume and 4% l.s. at quarter volume; and (b) a comparison on Cox's Orange Pippin between large-volume and small-volume spraying using 1% l.s. in both cases. In both trials hand-directed large-volume spraying gave the best control, but the control obtained with small-volume applications would be considered commercially satisfactory. In trial (a) the 4% l.s. caused serious fruit drop. In trial (b) there was no phytocidal effect from the small-volume 1% spray on the sensitive variety Cox.

293. BERAHA, L., AND POWELL, D.

The vapor phase toxicity of some biphenyl derivatives to *Monilinia fructicola*.

Phytopathology, 1953, 43: 383-6, bibl. 16.

In the Van Tieghem cell, o-fluorobiphenyl at 2,500 p.p.m. completely inhibited spore germination of *Monilinia fructicola*. In apple tissue plugs, o-fluorobiphenyl, o-chlorobiphenyl, p-chlorobiphenyl, biphenyl, and polyethyl biphenyl were toxic in the vapour phase at 160 p.p.m. as evidenced by the lack of rot after 72 hours. When inoculated apples were exposed to the vapour toxicants, at 2 p.p.m. for 72 hours, o-fluorobiphenyl, o-chlorobiphenyl, and biphenyl were the most effective in preventing rotting of the fruit; p-chlorobiphenyl allowed limited rotting but prevented sporulation. However, the effective compounds were shown to be fungistatic since replatings from exposed tissues allowed continuance of growth. Halogen derivatives were more toxic than those which contained the nitro, amino, or alkyl substituents, but all the effective compounds caused an off-flavour of the fruit. [From authors' summary.]—Dep. Hort., Univ. Ill., Urbana.

294. SMITH, W. L., JR., AND HALLER, M. H.

Control of post-harvest brown and rhizopus rots of peaches.

From abstr. in *Phytopathology*, 1953, 43: 406-7.

Sixty materials were tested for the control of *Monilinia fructicola* and *Rhizopus nigricans*. 0.5% dowicide A reduced injury by both organisms (67 and 57% reduction). 1% orthocide 406 and 0.5% isothan Q 15 were efficacious against *Monilinia* (76 and 75% reduction) but not against *Rhizopus*. Fumigation with ethylene compounds was efficacious against *Rhizopus* if carried out immediately after inoculation (58% reduction) but not against *Monilinia*. *Rhizopus* infections were reduced 82% and *Monilinia* infections 28% by wrapping in copper-impregnated paper (Hartman wraps).

295. WENZL, H., AND KAHL, E.

Versuche über die biologische Prüfung von Schwefelpräparaten an Monilia-Mumien. (Tests of sulphur preparations on monilia mummies.) [English summary 5 lines.]

PflSch. Ber. Wien, 1953, 11: 40-4, bibl. 3.

Lime-sulphur, barium sulphide and wettable sulphur sprays with corresponding elemental or polysulphide sulphur contents proved about equally effective in preventing the development of sporodochia on mummified apricot fruits infected with *Monilinia laxa*.

296. DELMAS, H. G.

L'oidium de l'abricotier en Roussillon.

(Mildew of apricot at Roussillon.)

Ann. Épiphyt., 1953, 4: 59-89, bibl. 34, illus.

Two wettable sulphur sprays (1%+spreader), applied about the middle of April and 10-15 days later, gave excellent preventive control of oidium on apricot without causing any injury to the trees. Where oidium spots had already appeared, applications of permanganate (0.2 kg./100 l.+spreader) followed by micronized sulphur, or of a dye compound (methylbenzene-azodiaminobenzene) were found to check the spread of the disease. The sulphur treatment was shown to be effective also against rust (*Puccinia pruni-spinosae*). The oidium was identified as *Podosphaera tridactyla* (= *P. oxycanthae*) and its biology is discussed.—Soc. co-op. Rech. Exp. agric. Pyrénées-Orientales, Perpignan.

297. KITAJIMA, H.

Studies on the dissemination of peach anthracnose. III. Histopathological observation. [Japanese, with English summary.]

Ann. phytopath. Soc. Japan, 1952, 16:

109-12, illus., from abstr. in *Rev. appl. Mycol.*, 1953, 32: 436-7.

Further studies on the peach anthracnose organism (*Gloeosporium laeticolor*) in Japan showed that the fungus passes into the twig through the peduncle without causing fruit drop. Isolations from sections of affected twigs demonstrated that in late spring colonization was restricted to the area round the point of attachment of young, diseased fruits, but by December the mycelium had invaded the entire twig. The fungus can also penetrate young shoots, but, as in nature these are generally too old to be infected by the time the conidia are disseminated, it is concluded that the young fruits afford the sole means of entry for the fungus.

298. DYE, D. W.

Control of *Pseudomonas syringae* with streptomycin.

Nature, 1953, 172: 683-4.

Glasshouse experiments on the control of stone fruit-blast (*Pseudomonas syringae*), a serious disease of stone fruit trees in New Zealand, were carried out with 23 proprietary fungicides and 5 antibiotic substances. Seedling peaches were used as test plants. The techniques of inoculation and treatment are described. None of the fungicides was highly effective, but streptomycin sulphate gave encouraging results without causing any injury at the 3 concentrations tested. On plants sprayed with this antibiotic at 250, 500 and 1,000 µg./ml. lesions occurred at only 16, 12 and 10% of the 60 inoculation points, compared with 87-93% on the controls. Moreover, the average length of lesions on treated plants was considerably shorter. Aureomycin also reduced infection, though less effectively.—D.S.I.R., Auckland, N.Z.

299. ZOBRIST, L., AND HOFFMANN, E.

Die Bekämpfung des Zwetschenrostes mit Zineb. (The control of plum rust by zineb.) [English summary 6 lines.]

Phytopath. Z., 1953, 21: 79-82, bibl. 3, illus.

As sulphur preparations fail to control *Tranzschelia pruni spinosae*, the importance of which has increased in Switzerland during the past decade, tests were carried out with zineb. The results showed that a single 0.2% zineb application (65% active substance) in mid-June gave protection to trees in bearing which showed little new growth, whereas young trees in full growth required a second treatment about the middle of July.

300. CATION, D.

Experiments with actidione for control of cherry leaf spot (*Coccomyces hiemalis*).

Abstr. in *Phytopathology*, 1953, 43: 468.

In 1952 actidione controlled leaf spot at 1 p.p.m. in 2 preharvest applications followed by 2 p.p.m. in 1 post-harvest application. One application of 2 p.p.m. before harvest applied at any 1 of 3 dates from petal fall to 20 days later and another spray after harvest controlled perfectly. Unsprayed trees were 90% defoliated by 1 August. An early application of a 2 p.p.m. concentration gave some leaf injury but typical fruit dwarfing was observed only on 1 limb of 1 tree out of 20 under observation. Sprays of 2 p.p.m. and 10 p.p.m. resulted in total fruit abscission when applied in early bloom on the sprayed side of half-tree plots. Two applications of 2 p.p.m. prevented defoliation in a budwood orchard at East Lansing. Three to four applications in various combinations of 1 p.p.m. and 2 p.p.m. gave results superior to bordeaux 4-6-100 in a commercial nursery. Applied after harvest as a 6× concentrate (12 p.p.m.) actidione checked leaf spot. The remaining leaves held until final observations, 17 October.

301. MCINTOSH, D. L.

A trunk and crown rot of sweet cherry in British Columbia.

Phytopathology, 1953, 43: 402-3, bibl. 1,

illus., being *Contr. Div. Bot. Plant Path.*,

Sci. Serv., Dep. Agric., Ottawa 1239.

Notes are given on a sweet cherry trunk and crown rot caused by a pathogen recently shown to be *Phytophthora cactorum*.

302. PELLETIER, E. N., AND HILBORN, M. T.

Blossom and twig blight of low-bush blueberry.

From abstr. in *Phytopathology*, 1953, 43: 481.

Blossom and twig blight of low-bush blueberry is caused by *Botrytis cinerea* Pers. which infects developing buds, stems and flowers if high humidity is maintained for at least 72 hours. There is a wide range of susceptibility within clones, and early chemical soil fertilization favours infection. A total of 41 fungicides and 12 antibiotics were tested for control. Of the antibiotics, rimocidin, thiolutin, and streptomycin sulphate were very inhibitory in slide germination tests but failed to control the disease in greenhouse tests. Of the fungicides, 5 named commercial products gave complete control in the glasshouse and 2 in the field.

303. POWELL, D.

An evaluation of chemical treatment for the control of *Botrytis cinerea* on strawberry.

From abstr. in *Phytopathology*, 1953, 43: 482.

Fungicide experiments have indicated promising results

for grey mould control but small, replicated plots have not been satisfactory for a full season evaluation. Field data show that the dissemination of grey mould is so rapid that chemical treatment is not very satisfactory when untreated patches exist in a treated area.

304. FULTON, R. H., AND CATION, D.
Comparison of fungicides for the control of strawberry leaf blight (*Dendrophoma obscurans*).
 From abstr. in *Phytopathology*, 1953, 43: 471-2.

Tag 331 (phenyl mercury acetate) was tested and found useful as an eradicant, and ferbam, captan and fixed copper as protectants on the very susceptible Robinson variety.

305. COOMBE, B. G.
Control of black spot on grape vines.
J. Dep. Agric. S. Aust., 1953, 56: 562-4.

Black spot [*Elsinoe ampelina*] has become widespread in South Australian vineyards despite intensive control efforts. In trials at Renmark in 1952-53 tetra methyl thiuram disulphide (TMTD) gave effective control. Spray recommendations are (1) 5% TMTD (plus 2-3 pt. white oil per 100 gal. water as a sticker) just before bud burst in areas where infection was severe in the previous growing season, or 3% where mild; (2) 1½% TMTD or a copper fungicide if infection recurs after bud burst.

306. GAUDINEAU, M., AND MESSIAEN, C. M.
 Mildiou de la vigne et nouveaux produits de lutte. (Control of vine downy mildew with new fungicides.)
Ann. Épiphyt., 1953, 4: 185-208, bibl. 26.

In 1951, a year of serious attack, good control of vine downy mildew [*Plasmopara viticola*] on leaves and fruit was obtained with 7 applications between early May and early August of 2 and 1% bordeaux mixture (1.5 and 5.4% of bunches destroyed by mildew), 1% Cu oxychloride (4.8-13.6%) and 0.5% cuprous oxide (11.5%), compared with 91% in the control. In 1951 0.3% zinc ethylene bis dithiocarbamate and 0.5% N-trichloromethylthiotetrahydrophthalimide gave the best results of the organic fungicides tested and were as efficacious as 1 and 2% bordeaux mixture. Bordeaux shows the best adhesion and with the other products it is the frequency of treatment between the end of May and the end of July (less than 15 days' interval between treatments from 1 June to 17 July in 1951) that is responsible for the good results they give.—*Stat. Path. veg.*, Pont-de-la-Maye.

307. COLE, J. R.
Comparative results of applying fungicides with hydraulic and mist sprayers to control pecan scab.
Proc. 44th annu. Conv. Southeast. Pecan Grs Ass., 1951, pp. 41-8, from abstr. in *Fruits d'Ostre Mer*, 1953, 8 (7), *Suppl. Fruits trop. sub trop.*, No. 10-5224.

Bordeaux mixture (0.48-0.12-100) gives satisfactory control of pecan scab [*Cladosporium effusum*] if applied twice before pollination, first on the emergence of the leaves and then when the leaves are a quarter to half grown. After pollination at least four 3-weekly applications of bordeaux (0.72-0.24-100) or of zinc dimethyl-

dithiocarbamate (0.24 kg. per 100 l. water plus ¼ l. summer oil) are required, beginning when the tips of the nuts turn brown.

308. MOREAU, C.
 Les champignons de l'atmosphère des entrepôts de fruits. (The airborne fungi of fruit warehouses.)
Fruits d'Ostre Mer, 1953, 8: 255-9, illus.

Notes are given on studies conducted in apple, citrus and tomato warehouses. In general, air contamination occurs less rapidly in refrigerated warehouses than in those at 11° C. while the atmosphere in conditioning rooms at 8-9° C. is on a par with that of refrigerators. A single spraying with 3% milk of lime reduced air contamination to about a quarter. Better results were obtained with a quaternary ammonium salt; a 5% spray reduced the number of colonies of 6 species from 570 to 73 and misting with the same salt (10%) at 1.5 l. per 30 l. water reduced the number of colonies of 10 fungi from 98 to 13.

Nematodes.

(See also 372i.)

309. GRAHAM, T. W., AND HOLDEMAN, Q. L.
The sting nematode *Belonolaimus gracilis* Steiner: a parasite on cotton and other crops in South Carolina.
Phytopathology, 1953, 43: 434-9, bibl. 14, illus.

Belonolaimus gracilis causes severe stunting and early death in strawberry crops in South Carolina but can be effectively controlled by soil fumigation with a nematocide. [For abstr. see *Ibid.*, 43: 291; *H.A.*, 23: 4024.]

Mites.

310. COLLYER, E.
Biology of some predatory insects and mites associated with the fruit tree red spider mite (*Metatetranychus ulmi* (Koch) in south-eastern England. IV. The predator-mite relationship.
J. hort. Sci., 1953, 28: 246-59, bibl. 23.

A comparison is made between the occurrence and relative abundance of predator species in an unsprayed, neglected orchard and in commercial orchards. The relationship between the predators and the fruit tree spider mite in these types of orchard is discussed, and several examples given of biological control of the mite which are compared with the control given by an acaricide. The effect of predators on winter eggs of the mite is described, and an account given of several factors which, in sprayed orchards, affect the predator populations. [Author's summary.]—East Malling Res. Stat.

311. ANON.
Does this solve the red spider problem?
Comm. Grower, 1953, No. 3014, p. 643, illus.

The development of a chemical called chlorocide, the active material of which is chlorparacide, is announced, for which it is claimed that one application will control fruit tree red spider throughout the season. It kills only the eggs and youngest mites and appears to be harmless

to all other insects and to man. The material will penetrate through leaves and thus kill eggs and mites not directly contacted by the spray. The single application should be made at the green or pink bud stage, i.e. when as much foliage has developed as possible before the winter eggs hatch. The material has undergone 2 years of field trials as well as tests by commercial growers.

312. ORTEGA, J. C.
Systemic pesticides on walnut.
Calif. Agric., 1953, 7 (10): 10.

Among several materials showing promise for the control of European red mite and walnut aphid were the systemic insecticides systox and pestox 3.

313. VAN DEN BRUEL, W. E., AND DERARD, J.
Le problème du tarsonème du fraisier. II. Essais de traitements curatifs effectués sur champ (1952). (The cyclamen mite of strawberry. II. Field trials 1952.)
Parasitica, 1953, 9: 75-88, bibl. 1.

The data presented in this second paper confirm the results obtained in preliminary trials [*H.A.*, 23: 2856], in that 2-3 generous applications (2,500 l. hectare) of parathion at a high concentration (0.17% of the commercial product used), made at a 10 days' interval, effectively reduced *Tarsonemus pallidus* populations on strawberry. The treatment, however, had little residual action, the build-up of the pest being rapid in the case of a heavy infestation. Lindane proved less satisfactory. —Gembloux.

314. MÜHLMANN, H.
Control of red mites in viticulture in Rhine Hesse.
Höfchenbriefe (English edition), 1953, 6: 73-9, illus.

Of the acaricides tested in several places two applications of parathion or one application of systox gave complete control on vines of the red spider mites, *Paratetranychus pilosus* and *Epitetranychus althaeae*. There was no advantage in adding wettable sulphur to parathion.

Insects.

(See also 372b, c, d, g, j, k, m, n, r, w, y, 382, 794.)

315. MOSEBACH, E.
Kontaktinsektizide als "Frassgifte" gegen Ameisen. (Contact insecticides as stomach poisons against ants.)
NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, 5: 121-4, bibl. 4.

Ants were allowed to feed on honey to which γ BHC had been added. In the experiments a single ant exposed to the bait for one minute was found to be capable of poisoning 40 further ants in the colony. Optimum dosages remain to be determined. —Biol. Bundesanst., Celle.

316. CHANDLER, S. C.
Timing plum curculio sprays on apple.
J. econ. Ent., 1953, 46: 506-9.

In trials in Illinois the number of plum curculios, *Conotrachelus nenuphar*, and the damage they caused on apples were greatly reduced by applying sprays in the pink bud stage instead of the usual calyx stage.

317. BÖHM, O.
Psidium maxillosum F. als Weinschädling in Österreich. (*Psidium maxillosum* as a vine pest in Austria.)
PflSch. Ber. Wien, 1953, 11: 45-6, bibl. 3.

The beetle feeds on the leaves, destroying the entire vine foliage in a mass infestation.

318. REICH, H.
Der Blütenknospenstecher (*Anthonomus cineris* Koll.). (The pear blossom weevil.
Mitt. ObstVersuchsrings Jork, 1953, 8: 209-11, bibl. 5.

Infestations of the pear blossom weevil have been increasing in the Altenland in recent years. Control by DDT-BHC preparations is recommended.

319. REGNIER, R., HURPIN, B., AND MAILLARD, J.
Peut-on prévoir l'importance et la date des grandes sorties printanières des hannetons? Quand doit-on traiter? (Can the scale and date of the main spring emergences of cockchafer be foretold? When should control measures be taken?)
C.R. Acad. Agric. Fr., 1953, 39: 572-8.

An account is given of a method of foretelling the intensity of the spring infestation of cockchafers (*Melolontha melolontha*) by soil sampling and of determining the flight dates by net traps. The timing of control operations is also discussed.

320. EHRENHARDT, H.
Bekämpfung von Engerlingen an Beerensträuchern auf Grund der Erfahrungen in Himbeerkulturen. (The control of cockchafer grubs in bush fruits based on results obtained with raspberries.)
Z. PflKrankh., 1953, 60: 512-13.

Applications of BHC in various forms before planting, at planting or after establishment are specified.

321. PLAUT, N.
A new white grub on apple in Israel.
FAO Plant Prot. Bull., 1953, 1: 171.

Namely a species of *Pentodon* feeding 5 to 20 cm. below ground on stems of seedling apples, the result being wilting and withering.

322. VASSEUR, R., AND SCHWESTER, D.
Procédés de lutte contre le xylobore disparate, *Xyleborus dispar* F. (Col. Scolytidae). (Methods of control of the shot hole borer, *Xyleborus dispar*.)
Ann. Epiphyt., 1953, 4: 167-72, bibl. 4.

0.2% DDT or BHC with 1% summer oil added was applied at the end of March on 12-year-old cordon apples. On inspection in early May and early June all trees, including those previously infested, were found to be virtually free from infestation. A case of successful emulciant treatment is also quoted. (See p. 4, 22, 3657) —Lab. Pou San Jose, Saint-Gilles-Laval.

323. AVETON, Z., AND OTHERS.
Experiments in controlling the Mediterranean fruit fly (*Caratitis capitata* Wied.) and the olive fly (*Dacus oleae* Gmel.). (Hebrew and English.)
Bull. Rehovot agric. Res. Stat., 59, 1953, English pp. 22, Hebrew pp. 22, bibl. 8.

Mediterranean fruit fly. (1) On peach: Methoxy-DDT, DDT and dieldrin controlled the pest in hilly areas of Israel if applied at least a fortnight before the beginning of fruit ripening. Treatments with the first two insecticides should be repeated weekly while a single application of dieldrin gave sufficient protection. (2) On plum: Methoxy-DDT proved superior to DDT, spraying giving better results than dusting. The treatment should begin at least a fortnight before harvesting, 3 weeks in the case of late varieties, and should be repeated at weekly intervals, the last application being made 5-6 days before picking. (3) Control by dieldrin: in trials on a variety of fruits with a range of concentrations dieldrin gave good control at relatively high concentrations, for instance 0.5% active matter. *Olive fly*: in experiments at two places two applications of dieldrin (2%) controlled the pest satisfactorily, but in one place citrus mealy bug (*Pseudococcus citri*) infestation increased as a result of the treatment.

324. SCHMIT, J.
Tests to control the cherry maggot with phosphoric ester preparations.
Höfchenbriefe (English edition), 1953, 6: 113-17.

Very satisfactory control of the cherry fruit fly was obtained in Luxemburg by one thorough application of parathion 12 days before harvest. Toxic residues do not persist.

325. STENMARK, A., AND TUNBLAD, B.
Till äpplebladloppans bekämpning. (The control of apple leaf hopper.)
Växtskyddsnotiser, 1953, pp. 39-42, illus.

Following reports of increased leaf hopper infestations on apple a preliminary spraying trial was carried out at the Plant Protection Institute, Stockholm. None of the winter washes tested gave really satisfactory results.

326. KRIEGLER, P. J.
Spraying for mealy bug on table grapes during different periods of the year.
Decid. Fruit Gr, 1953, 3 (10): 8.

It had been shown that mealy bugs could be controlled on table grapes by 1 or 2 applications of parathion in the summer [see *H.A.*, 23: 2871]. Further trials with sprays of 0.023% actual parathion during the 4 seasons of the year showed spring spraying to be the most, and winter spraying the least, effective. Spring spraying was also more economical in amount of spray needed and in man-hours than summer or autumn spraying.

327. N.S.W., DEPARTMENT OF AGRICULTURE.
The fruit-tree moth borer.
Agric. Gaz. N.S.W., 1953, 64: 499-500, illus.

Notes on *Cryptophaga unipunctata* and its control. The caterpillars are pests of peach, nectarine, plum and wattle and to a lesser extent of apricot, cherry and prune.

328. TASCHENBERG, E. F.
Currant borer control studies.
J. econ. Ent., 1953, 46: 394-400, bibl. 6,
being *J. Pap. N.Y. St. agric. Exp. Stat.* 896.

In recent years the currant borer, *Ramosia tuptiformis*, has become an important pest in the principal red currant producing district of New York, and in many plantations it has become necessary to adopt some

control measure other than the one usually recommended, which is to cut out the infested shoots. Of 5 organic phosphorus and 2 chlorinated hydrocarbon insecticidal sprays evaluated in field trials, parathion was the most satisfactory. One application 10 to 14 days after the emergence of the first moths was found sufficient, and 15% parathion at 1.5 lb. per 100 gal. gave 95% reduction in the borer population. Harvest residues from parathion treatments were very low, 0.33 p.p.m. or less.

329. CUTRIGHT, C. R.
Grower control of the codling moth; a five year study of field practices.
Res. Bull. Ohio agric. Exp. Stat. 720, 1953, pp. 53, bibl. 11.

This bulletin presents the findings of a 5-year study (1944-48) of field practices to control codling moth in apple orchards of Ottawa County, Ohio. Codling moth developed resistance to lead arsenate in the majority of the orchards, and a rapid change-over to DDT was made in 1946 with good results. The effect of DDT on mite populations is considered. In general, the moth was found more difficult to control in older orchards; the degree of control under sod and sod mulch systems of culture, prevalent in the area, was about equal. Pruning was an aid to spraying, as was fruit thinning. The type of equipment used had no influence on the effectiveness of control, provided the amount of spray was adequate and evenly distributed. Much better results were obtained when the treatment was completed within a short period. Ten susceptible and 4 relatively resistant apple varieties are listed, but it was found that by modern methods satisfactory results can be obtained even on the most susceptible varieties.

330. NEWCOMER, E. J., AND DEAN, F. P.
DDT and other new insecticides for codling moth control in the Pacific Northwest.
J. econ. Ent., 1953, 46: 414-19, bibl. 16.

An initial application of 50% DDT at 2 lb. per 100 gal., followed by 2 or 3 applications at 1 lb., without the addition of any other material, gave much better control of codling moth on apples than 6 or 7 applications of lead arsenate or cryolite. Parathion or toxaphene added to the DDT did not improve control, and used alone were less effective than DDT. Methoxychlor and CS-708 were almost as effective as DDT. Residues from DDT at harvest have always been well below the accepted limit of 7 p.p.m., but there has been a gradual accumulation of DDT in the soil under apple trees sprayed with it. [From authors' summary.]

331. GRIOT, M. A., AND SARLO, M. A.
Lucha biológica contra el "gusano" del duraznero. (Biological control of the oriental fruit moth [*Cydia molesta*].)
Rev. argent. Agron. B. Aires, 1953, 20: 147-51, bibl. 2.

Notes are given on the biological control in Argentina of *Cydia molesta*, a serious pest of peach, by *Macrocentrus ancyliivorus*. Releases number some 200,000, mostly in the Delta, and have been made annually from 1946-47. Parasitism lasts 2 years. In one plantation the 1950-51 release resulted in 20% parasitism in 1951-52; up to 60% parasitism has been obtained from a series of annual releases. The parasite spreads

naturally; in one plantation 3 km. from the nearest place of release 30% parasitism was recorded in 1952.

332. GEIER, P., AND BAGGIOLINI, M.
Observations sur la tordeuse orientale du p  cher (*Laspeyresia molesta* Busck) en Suisse romande et italienne. (Observations on the oriental fruit moth of peach in French and Italian-speaking Switzerland.)
Landw. Jb. Schweiz, 1953, 2 (n.s.): 971-80, bibl. 14, illus.

Since 1950 the oriental fruit moth has become an important peach pest in southern Switzerland causing damage also to late pome fruit varieties. Its biology is discussed. In the winters of 1951/52 and 1952/53, 82 and 72% respectively of the hibernating larvae were found to be parasitized by the ichneumon *Lissonota buoliana*. Their own observations and the encouraging results obtained in Italy caused the authors to recommend biological rather than chemical control of the pest.—Lausanne.

333. GEIER, P., AND OTHERS.
Estimation des populations de vers de la grappe (*Clysia ambiguella* Hb. et *Polychrosis botrana* Schiff., Lep. Tortric.). (Estimating caterpillar populations on vines.)
Landw. Jb. Schweiz, 1953, 2 (n.s.): 953-8, bibl. 3.

A formula is suggested for estimating the density of vine moth and grape berry moth larvae in vineyards.—Lausanne.

334. GEIER, P.
Adoxophyes orana F.R. (= *Capua reticulana* Hueb.), une nouvelle tordeuse observ  e dans les vergers romands en 1953. (*Adoxophyes orana*, a new tortrix moth recorded in orchards in French-speaking Switzerland in 1953.)
Rev. romande Agric. Vitic., 1953, 9: 83-4, illus.

The biology of the summer fruit tortricid under Swiss conditions is briefly discussed. It is too early to assess the significance of the appearance of this pest in Switzerland.

335. SOENEN, A.
The tortrix moths of our fruit trees.
H  fchenbriefe (English edition), 1953, 6: 117-21, illus.

Recommendations for control of the summer fruit tortricid, *Capua reticulana* [= *Adoxophyes orana*], are briefly discussed by the Director of the Centre des Recherches de Gorseme (St. Trond.), Belgium.

336. EHRENHARDT, H.
  ber den Einfluss von Temperatur und Futterpflanze auf die Entwicklung von *Hyphantria cunea*. (On the influence of temperature and host on the development of *Hyphantria cunea*.)
NachrBl. dtsh. PflSchDienst., Braunschweig, 1953, 5: 145-50, bibl. 7.

From the data presented it is concluded that *Hyphantria cunea* might become established in many areas of Western Germany.

337. STELLWAAG, F.
Versuche zur Abt  tung der Reblaus unter Erhaltung des Stockes 1951/52. (Experiments on the killing of phylloxera without destroying the vines in 1951/52.)
Weinblatt, 1952, 47: 639-44, from abstr. in *Z. PflKrankh.*, 1953, 60: 507.

The following treatment applied while no eggs were present on the vine roots, either in October or November or from March to the beginning of June, gave very satisfactory phylloxera control: a combination of 72 cm.³ CS₂ applied in dosages of 9 c.c. between 4 vines in 8 shallow holes, which were closed immediately, together with watering of the root collar with 5 l. BHC emulsion or suspension (0.3 or 0.5%). This treatment, which in sandy soils should be repeated after 1-2 years, is recommended by the Biologische Bundesanstalt for the re-establishment of large areas, where grafted vines are gradually being introduced, but only before symptoms of decline have appeared. Application of pestox or systox did not control the pest.

338. LEKIĆ, M.
  tetne vrste iz roda *Hoplocampa* koje se kod nas javljaju. (Harmful species of *Hoplocampa* occurring in Jugoslavia.) [English summary 4½ pp.]
Zasht. Bilja, Belgrade, 1953, No. 18, pp. 18-48, bibl. 18, illus.

Hoplocampa flava, *H. minuta* and *H. rutilicornis* were observed on cultivated *Prunus* spp., *H. testudinea* on apples and *H. brevis* on pears. An account is given of the life history, habits and attempts at controlling the sawflies with arsenical, pyrethrum, nicotine and quassia preparations and a number of synthetic organic insecticides containing DDT, BHC and parathion. On plums DDT was found satisfactory, and well-timed applications of nicotine, quassia and pyrethrum compounds were also promising. Parathion was applied to both plums and pome fruits with good results.

339. DICKER, G. H. L.
Some notes on the biology of the apple sawfly, *Hoplocampa testudinea* (Klug).
J. hort. Sci., 1953, 28: 238-45, bibl. 14, illus.

These observations at East Malling in the years 1947-51 throw much light on adult population, egg laying and larval history of the apple sawfly.

340. N.S.W., DEPARTMENT OF AGRICULTURE.
The pear and cherry slug.
Agric. Gaz. N.S.W., 1953, 64: 437, illus.

Commonest in the cooler districts, the sawfly *Caliroa limacina* is a pest of pear and cherry and to a lesser extent of plum and quince. Control is by lead arsenate or DDT.

341. VAN MARLE, G. S.
Een interessante waarneming over het schadelijk optreden van de zuringbladwesp (*Ametastegia glabrata* Fall.). (An interesting observation on a case of damage due to *Ametastegia glabrata* Fall.)
Tijdschr. PlZiekt., 1953, 59: 205-6, bibl. 2.

The apple crop from one part of a bush-orchard with a cover crop of vetch was seriously damaged by the larvae

of *Ametastegia glabrata* Fall. In the other part of the same orchard planted with an under-crop of potatoes there was no damage at all. The difference was attributed to the presence in the vetch of the weed *Polygonum convolvulus* L., a known host-plant of the sawfly larvae. This weed, which climbed into the trees, was absent from that part of the orchard where the potatoes were grown. An experiment is planned with different green-manuring plants in the infested orchard to investigate their effects on the development of the weed and consequently on the damage by the sawfly larvae. [Author's summary.]

342. JANCKE, O.

Blattwespenlarven an Reben. (Larvae of dock sawfly on vine.)

NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, 5: 119-20, illus.

Larvae of *Ametastegia glabrata* were found to hibernate in the pith of vine shoots.

343. BRENY, R., AND DETROUX, L.

Rhogogaster viridis L.: Une ténthède nuisible au fraisier. (*Rhogogaster viridis*, a sawfly pest of strawberry.) [English summary 3½ lines.]

Parasitica, 1953, 9: 89-95, bibl. 12, illus.

Damage to strawberry leaves caused by *Rhogogaster viridis* larvae is illustrated and the biology of the pest is discussed. Of the insecticides tested in laboratory trials, parathion dust (0.5% active substance) gave the best results.—Gemblooux.

344. HAMILTON, D. W., AND SUMMERLAND, S. A.
Distribution and control of Forbes scale in the Midwest.

J. econ. Ent., 1953, 46: 494-8, bibl. 8.

A survey in 4 States showed Forbes scale, *Aspidiotus forbesi*, to be the predominant species in apple, plum and cherry orchards, and also to be present in one peach orchard. For its control multiple summer applications of low concentrations of parathion, malathion and metacide were found most effective. Dormant oil sprays reduced infestation but did not give complete control.

345. VASSEUR, R., AND BIANCHI, H.

Sur l'efficacité de produits insecticides divers utilisés contre les cochenilles diaspiques des arbres fruitiers en traitements d'hiver. (On the efficacy of certain insecticides against diaspid scales of fruit trees in the dormant season.)

Ann. Épiphyt., 1953, 4: 45-58, bibl. 5.

An account is given of trials in 1948-51 in which the effects of a wide range of winter washes on *Aspidiotus perniciosus* (San José scale), *Epidiaspis leperii* (grey pear scale) and *Diaspis pentagona* (mulberry scale) were tested. Only mineral oil emulsions (as opposed to miscible forms) gave satisfactory results (99-100%). The addition of DNC enhanced the effect of the oils, but the improvement was not constant and varied with weather and other conditions. The rate required for San José scale with white oil is 3%; with yellow oil 2.0-2.5% is sufficient, provided 50-60 g. DNC is added per hl. For the other 2 scales rates of at least 6% are essential and there is a risk of burn towards the end

of the season, especially with peach.—Lab. Zool. agric., Saint-Genis-Laval.

346. MATHYS, G.

Observations sur la mobilité des larves néonates de *Quadraspidiotus perniciosus* Comst. et sur leur transport par le vent. (Observations on the mobility of newly-hatched San José scale larvae and on their spread by wind.)

Landw. Jb. Schweiz., 1953, 2 (n.s.): 981-4, bibl. 10.

Newly-hatched larvae of San José scale were shown to be a source of infestation to neighbouring trees as soon as air currents reached a velocity of 1 m./sec.—Lausanne.

347. VASSEUR, R., AND BENASSY, C.

Sur la faune parasitaire du pou de San José (*Quadraspidiotus perniciosus* Comst.) dans la région lyonnaise et ses relations avec les conditions climatiques. (Climatic conditions and the parasitic fauna of the San José scale (*Aspidiotus perniciosus*) in the Lyons region.)

Ann. Épiphyt., 1953, 4: 283-90, bibl. 1.

Neither *Aphytis proclia* nor *A. mytilaspidis*, the principal predators of the San José scale in the Lyons area of France, could be used in biological control as the climate is not sufficiently favourable for them to become abundant.

348. BACHMANN, F.

Untersuchungen an den gelben Obstbaumschildläusen *Quadraspidiotus piri* Licht. und *Quadraspidiotus schneideri* n.sp. (Studies on the yellow fruit tree scales *Quadraspidiotus piri* and *Quadraspidiotus schneideri* n.sp.)

Z. ang. Ent., 1953, 34: 357-404, from abstr.

in Z. PflKrankh., 1953, 60: 504-5.

Detailed studies in Switzerland showed that *Quadraspidiotus piri* comprises two species, one of which was named *Quadraspidiotus schneideri* n.sp. For biological reasons, which are given, the application of winter washes should be delayed until the scales have resumed their activity. Summer applications of insecticides proved unsuccessful.

349. LORD, F. T., AND MACPHEE, A. W.

The influence of spray programs on the fauna of apple orchards in Nova Scotia. VI. Low temperatures and the natural control of the oystershell scale, *Lepidosaphes ulmi* (L.) (Homoptera: Coccidae).

Canad. Ent., 1953, 85: 282-9, bibl. 7.

The first of this series of papers appeared in *Scientific Agriculture* in 1946. The others have appeared in the *Canadian Entomologist*.

350. CHANDLER, S. C.

Life history and control of pecan spittlebug.

J. econ. Ent., 1953, 46: 450-4, bibl. 3, illus.

In trials conducted in 1952 the 3 insecticides lindane, BHC and dieldrin were again most effective against pecan spittlebug, *Clastoptera* [= *Cercoptera*] *achanita*. [See also *H.A.*, 23: 2889.]

Other pests.

(See also 1058.)

351. FALJKENŠTEĪN, B. JU.

Methods of protecting orchards from rodents. [Russian.]*Sad i Ogorod*, 1953, No. 10, pp. 62-4.

For the control of rodents damaging orchards and nurseries during the dormant season, a poisoned bait of 500 g. each of oat and sunflower seed, 30 g. of sunflower seed oil and 50 g. of zinc phosphide is recommended. The bait should be placed in small mulch-cardboard pipes, thereby becoming inaccessible to birds, and before the onset of snow it should be covered with poisoned hay, straw and litter. About 50 pipes should be distributed per ha. For the direct protection of trees, non-poisonous or preferably poisonous repellent coatings, again containing zinc phosphide, are recommended.

352. MINISTRY OF AGRICULTURE, LONDON.

Rats and mice on the farm.*Bull. Minist. Agric. Lond.* 30, 8th edition, 1953, pp. 17, illus., 2s.

The subjects discussed include prevention of infestation, control by poison baiting, poisonous gases and trapping, and maintenance of control. Extracts from *The prevention of damage by pests Act 1949 and regulations made thereunder* are reprinted in an appendix.

353. STRATTON, C. L.

A new machine for better mouse control.*Amer. Fruit Gr.* 1953, 73 (9): 19.

The machine is said to make a satisfactory artificial mouse trail $2\frac{1}{2}$ to 3 in. below the surface. A workman sitting on the rear seat slips poisoned bait into the trail every 4 feet.

354. MILLER, M. A.

Experimental studies on poisoning pocket gophers.*Hilgardia*, 1953, 22: 131-66, bibl. 27, illus.

Pocket gophers (*Thomomys bottae navus*) are major agricultural pests, especially in the western U.S.A. In particular they injure orchard trees and other crops by gnawing roots, bark, bulbs or other growing parts and their burrowing causes costly leakages in irrigation reservoirs and ditches. Among 9 poisons field-tested on standard bait (mainly carrot), only Compound 1080, and to a lesser extent strychnine alkaloid and strychnine sulphate, gave practical kills. Three classes of bait materials, namely root vegetables, grains and fruits, were all highly effective when poisoned with Compound 1080, whereas with strychnine root vegetables were significantly more effective than the other baits. Detailed recommendations and estimates of costs of poisoning are given.

355. GLENDENNING, R.

Slug control in Canada.*Processed Publ. Canada Dep. Agric. Div. Ent.* 85, 1952, pp. 5.

By sanitation, soil cultivation, traps and barriers, metaldehyde bait, contact dusts, and protection of natural enemies.

356. CHILDS, W. H.

Bird control in blueberries.*A.R. W. Va agric. Exp. Stat. for 1952/53*, being *Bull. W. Va agric. Exp. Stat.* 357, part 4, 1953, pp. 3, 10, illus.

Explosions and stuffed and bronze owls having proved incapable of keeping birds off the blueberries, recourse was had to used tobacco cloth [from illustration looks like thin cotton gauze]. It was found satisfactory but a nuisance. Later aluminium strips 4 in. wide were twisted and hung in the rows, one side being silver and the other coloured red, blue or green. They flash with any movement of the air and have been successful against small numbers of birds, but need further testing against birds in numbers.

Antibiotics.

(See also 372v.)

357. DUNEGAN, J. C., AND WILSON, R. A.

Some effects resulting from the introduction of antibiotics into fruit trees.From abstr. in *Phytopathology*, 1953, 43: 405.

Streptomycin and terramycin caused chlorosis in pear and peach. Terramycin reduced leaf drop due to *Xanthomonas pruni* in peach.

Fungicides.

358. CIFERRI, R.

Cinque anni di esperienze con anticrittogamici a base di etilenbisditiocarbamato di zinco. (Five years work on fungicides based on zinc ethylenebisdithiocarbamate.)*Not. Mal. Piante*, 1953, No. 23, pp. 3-19.

Good results have in the main been achieved by the use of this zinc derivative, usually dithane Z-78 in 0.3% water suspension, against a large number of specific diseases of fruits, vegetables, tobacco and some ornamentals. Disappointing results were obtained against *Sclerotinia sclerotiorum* and against *Botrytis fabae* on beans, *Alternaria malorum* on apples and *Ascochyta pisi* on peas.

359. LEWIS, G. D., AND SHAY, J. R.

Control of summer diseases of apple.*Plant Dis. Repr.*, 1953, 37: 84-7, illus.

Captan (formerly SR 406) in the form of orthocide 406 gave good control of black pox (*Helminthosporium papulosum*), flyspeck (*Leptothyrium pomi*), sooty blotch (*Gloeodes pomigena*) and fruit rot (*Botryosphaeria ribis*) on Golden Delicious apples in Indiana in 1952 without adverse effects on fruit finish. Other materials tried in this and previous years had either failed to exercise control or had caused fruit russetting.

360. SHARVELLE, E. G.

Effect of summer fungicides on the finish of russet-sensitive apples.*Plant Dis. Repr.*, 1953, 37: 232-4, bibl. 1, illus.

Sprays of captan (orthocide 406 = n-trichloromethylthio-tetrahydrophthalimide) gave the fruit of the russet-sensitive varieties Golden Delicious and Grimes Golden a much better finish than did sprays of bordeaux

mixture or wettable sulphur [see also preceding abstract].

361. CARO, D.

Azione antisettica del sale sodico dell'acido deidroacetico (DHA-S). (Fungicidal action of the sodium salt of dehydroacetic acid.) [English summary 9 lines.]

Ann. Sper. agrar., 1953, 7: 1651-7, bibl. 4.

Laboratory tests confirmed its powerful fungicidal action on some fruit-rotting fungi.

Spray application and residues.

(See also 372q, x, 373d, 1058.)

362. KEARNS, H. G. H., AND MORGAN, N. G.
Spray application problems: V. The automatic low-pressure spraying of small bush fruit.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 95-8, bibl. 1, illus.

1. Automatic spraying of black currants can be carried out satisfactorily at one-third of the inclusive cost of lance spraying. The method is equally suitable for dwarf-pyramid and cordon apples. 2. A brief specification of the automatic sprayer is given. 3. The automatic sprayer can be fitted with a simple gear pump with a throughput of 18-20 gallons per minute at 75 lb. per sq. in. This gave a satisfactory performance. [Authors' summary.]

363. ADAMS, R. E.

Mist spraying less injurious than hydraulic spraying to sour cherries and apples.

From abstr. in *Phytopathology*, 1953, 43: 465.

Mist sprays of a Cu compound on Montmorency cherries and of wettable S (with or without an adjuvant) on McIntosh apples were applied at 1-8 times the concentration of similar gun sprays. Equal or superior disease control and less injury, except with the 8× mist spray on cherries, resulted from the mist spray compared with the gun spray treatments. The results obtained indicate that mixtures containing different adjuvants differ both in the severity of injury caused and disease control obtained.

364. MACCREARY, D., AND CONNELL, W. A.

Concentrate sprays on fruits and vegetables. *Trans. Peninsula hort. Soc.*, 1951, 41 (5): 124-31, bibl. 9, being *Misc. Pap. Del. agric. Exp. Stat.* 135 [received 1953].

Apples and peaches were treated successfully, but the equipment used for the control of Mexican bean beetle needs improvement.

365. EBELING, W., AND PENCE, R. J.

Pesticides formulation. Influence of formulation on effectiveness.

J. agric. Food Chem., 1953, 1: 386-97, bibl. 5.

The results of trials with a number of modern insecticides against two-spotted mites on lima beans and avocado pears are reported. Per unit of toxicant deposited, emulsions have usually been more effective than suspensions as topical applications, but less effective as residues.

J.S.

366. THOMAS, W. D. E., AND SIMS, A. J.

Spray application problems. III. A sedimentation method for the determination of the effective particle size distribution of dispersible powders.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 84-9, bibl. 3, illus.

The modified Andreasen method described has been developed particularly for DDT dispersible powders, but can be adapted for the examination of other dispersible powders provided a convenient method is available for determining the active principle available.

367. TRIVELLI, G.

Adhérence et persistance des bouillies cupriques sur les feuilles et les grappes de la vigne. (The adhesion and persistence of copper sprays on vine leaves and grapes.)

Landw. Jb. Schweiz, 1953, 2 (n.s.): 941-4, bibl. 4.

Observations in the vineyard had shown that some copper fungicides give better protection to the leaf and others to the grape. The author has now worked out a laboratory test which allows one to forecast the persistence of copper residues on foliage and fruit in the field. The method is described.—Lausanne.

368. MARTIN, J. T.

Spray application problems. I. The distribution of copper and lime-sulphur deposits.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 71-4, bibl. 2, illus.

Spray application problems are reviewed, and simple methods are described for recording the distribution of copper and lime-sulphur spray deposits on plant surfaces. [Author's summary.]

369. MORGAN, N. G.

Spray application problems. VI. A laboratory technique using *Botrytis fabae* on broad bean for the biological evaluation of fungicidal spray deposits.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 99-102, illus.

A technique, using *Botrytis fabae* on broad bean, for the biological evaluation of copper fungicide deposits is described. Whole bean plants in pots or single detached leaves are treated with the fungicide and allowed to dry. They are then uniformly covered with a *Botrytis* spore suspension either as a complete film or as separate droplets, enclosed in individual glass humidity chambers, and placed in an incubator at 21° C. After 16 hours the distribution of the *Botrytis* lesion spots can be used as an indication of the distribution of an effective fungicide deposit. The technique can be used: (a) as a biological check on chemical analysis and indicator methods, (b) for investigating the factors influencing efficiency of fungicide deposits obtained by various methods of spray application. [Author's summary.]

370. TIMBERLAKE, C. F., AND POLLARD, A.

An investigation of lead arsenate spray residues on apples and in their products.

A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 151-62, bibl. 9.

Studies on Bramley and the cider variety Dabinett,

sprayed 0, 1 or 2 times with commercial lead arsenate during July, indicate that where fruit is to be consumed fresh the tolerance for lead is more likely to be exceeded than the tolerance for arsenic, but that juice prepared from the fruit or pectin prepared from the pomace may contain excessive amounts of arsenic. The amount of residue on the fruit can be reduced by the use of acid washes, but, in the absence of washing, residues on fruit sprayed as late as mid-July are likely to approach present permitted limits.

371. MARTIN, J. T., BATT, R. F., AND JACKSON, P.
Spray application problems. II. DDT and copper residues on soft fruits.
A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 75-83, bibl. 13.

The levels and persistence of DDT residues on gooseberry, raspberry, loganberry, blackberry, black currant and tomato and of copper residues on tomato have been examined following application at the rates used commercially. Little risk occurs of significant DDT residues provided that application is made at an early stage of fruit development. [Authors' summary.]

Noted.

372. a ADAM, A., ANDERSON, H. W., AND POWELL, D.

Origin of peach bacterial spot spring cankers.
 From abstr. in *Phytopathology*, 1953, **43**: 465.

Due to *Xanthomonas pruni*.

- b ANON.
 Rode schorsmade van framboos (*Thomasiana theobaldi* Barnes), een voor Nederland nieuwe plaag in de frambozen. (The raspberry cane midge (*Thomas[in]iana theobaldi* Barnes), a new pest of raspberries in Holland.) *Fruiteelt*, 1953, **37**: 696-7, illus.

- c ANON.
The fig-twig borer.
Agric. Gaz. N.S.W., 1953, **64**: 501, illus.
Hylesinus fici and its control by the removal and burning of infested twigs.

- d AVIDOV, Z.
Biological and ecological studies on the codling moth (*Carpocapsa pomonella* L.) in Israel. [Hebrew, with abridged English translation 8½ pp.]
Ktavim, 1952, **2/3**, Hebrew pp. 155-89, bibl. 16, English pp. 43-51.
 A detailed 10-year study.

- e BLOCH, R.
Defense reactions of plants to the presence of toxins.
Phytopathology, 1953, **43**: 351-4, bibl. 25.
 A review.

- f BOLLE, F.
 Über die Auswertung von pflanzenschutzlichen Versuchen. (The evaluation of plant protection experiments.)
Angew. Bot., 1953, **27**: 16-23.

- g BORDEN, A. D., LANGE, W. H., AND MADSEN, H. F.

A spotted tentiform leaf miner outbreak in California orchards.

J. econ. Ent., 1953, **46**: 519, illus.

Lithocolletis crataegella on apple, pear and cherry foliage.

- h BOYLE, J. S.
A quick method of determining virus transmission through cherry seeds.
 From abstr. in *Phytopathology*, 1953, **43**: 467.
 Cucumber inoculation.

- i BROWN, E. B., AND FRANKLIN, M. T.
Experiments on the control of eelworm in black currants.
Plant Path., 1953, **2**: 101-2.
 For another account see *H.A.*, 23: 4021.

- j CAIRASCHI, E. A., AND OTHERS.
 Les enseignements de l'opération hannetons de Rambervillers. (Lessons learned in cockchafer control at Rambervillers.)
C.R. Acad. Agric. Fr., 1953, **39**: 584-7.
 Large-scale (15,000 ha.) control.

- k CHANDLER, S.
Timing of plum curculio sprays on apple.
Trans. Ill. St. hort. Soc. for 1952, 1953, **86**: 46-55.

- l DUNEGAN, J. C., MOON, H. H., AND WILSON, R. A.
Further results on testing susceptibility of pear seedlings to *Erwinia amylovora*.
 From abstr. in *Phytopathology*, 1953, **43**: 405.

- m EHRENHARDT, H., AND DIERCKS, R.
 Über die Ausbreitung, Lebensweise und Bekämpfung des Weissen Bärenspinners in Europa. (Distribution, biology and control of *Hyphantria cunea* in Europe.)
NachrBl. dtsh. PflSchDienst., Braunschweig, 1953, **5**: 113-19, bibl. 21, illus.

- n FRANZ, J.
 Neue Möglichkeiten und Ergebnisse der biologischen Schädlingsbekämpfung. (Results obtained in biological pest control and a discussion of new possibilities.)
Mitt. biol. Zentralanst. Berlin-Dahlem, 1953, Hft 75, pp. 12-22, bibl. 46.

- o HEWITT, W. B., AND DELP, C. J.
Yellow mosaic of grapevines and evidence of retention of the virus in the soil.
 From abstr. in *Phytopathology*, 1953, **43**: 475.

- p JENNINGS, J. P.
Grapevine anthracnose [*Elsinoe ampelinum*]. Relative susceptibility of varieties [at Nuriootpa].
J. Dep. Agric. S. Aust., 1953, **57**: 23.

- q KEARNS, H. G. H., AND MORGAN, N. G.
Equipment for spraying apples and pears.
Grower Annual Fruit Suppl., Autumn 1953,
pp. 32-4, illus.
- r LAUE, G.
Die Anwendung des Phosphorwasserstoffes
PH₃ unter besonderer Berücksichtigung der
Schädlingsbekämpfung. (The application of
hydrogen phosphide with special reference to
pest control.)
NachrBl. dtisch. PflSchDienst, Berlin, 1953,
7: 148-55, bibl. 118.
A discussion of zinc and other phosphides
for rodent control is included.
- s MARSH, R. W.
Apple and pear scab from 1903 to 1953.
Grower Annual Fruit Suppl., Autumn 1953,
pp. 40-2.
Research on the life history of the fungus
and its control is reviewed.
- t MILLER, P. W.
Aphid *Myzus solani* does not transmit
strawberry yellows virus complex.
Plant Dis. Repr., 1953, 37: 89, bibl. 9.
- u MINISTRY OF AGRICULTURE, LONDON.
Apple and pear canker.
Adv. Leaf. Minist. Agric. Lond. 100, 1953,
pp. 4.
- v MIRIC, M., AND DUNEGAN, J. C.
An antibiotic substance toxic to *Xantho-*
monas pruni produced by *Aspergillus*
niger.
Plant Dis. Repr., 1953, 37: 157-8, bibl. 2,
illus.
- w NAGY, B., REICHART, G., AND UBRIZSY, G.
Der amerikanische weisse Bärenspinner,
Hyphantria cunea Drury, in Ungarn. (The
fall webworm in Hungary.)
NachrBl. dtisch. PflSchDienst, Berlin, 1953,
7: 191-5, bibl. 13, illus.
- x RAUCOURT, M., VIEL, G., AND CHEVREL, J.
Étude sur les traitements aériens par
poudrage. I.—Étude de la répartition des
poudres. (Crop dusting from the air. I.
Distribution of the dust.)
Ann. Épiphyt., 1953, 4: 227-56, bibl. 11.
Dust distribution as affected by method of
application and by wind.
- y RINGS, R. W., AND LAYNE, G. W., Jr.
Radioisotopes as tracers in plum curculio
behaviour studies.
J. econ. Ent., 1953, 46: 473-7, bibl. 5.
- z SKILES, R. L., AND KING, T. H.
Strawberry stunt virus in *Fragaria vesca*.
Plant Dis. Repr., 1952, 36: 406-7, bibl. 5.
373.
a TOGLIANI, F.
Una maculatura parassitaria dei frutti
pendenti di melo della varietà "Calville
Bianca" causata da *Phoma rubefaciens*
n.sp. (P.T.). (A spotting of unharvested
Calville Blanche apples due to *Phoma*
rubefaciens.) [English summary 5 lines.]
Ann. Sper. agrar., 1953, 7: 1621-8, bibl. 5,
illus.
- b TOGLIANI, F.
Sulle cause della variazione del colore nelle
foglie di pesco colpito dal "mal del piombo"
ad apparizione estiva. (On the causes of
variation in colour of peach leaves affected
by silver leaf appearing in summer.) [English
summary 8 lines.]
Ann. Sper. agrar., 1953, 7: 1647-50, illus.
- c TOGLIANI, F., AND FILOCAMO, E. F.
Osservazioni su di un caso di "mal del
piombo" parassitario del melo. (Notes on
a case of silver leaf in apple.) [English sum-
mary 9 lines.]
Ann. Sper. agrar., 1953, 7: 1629-38, bibl. 10,
illus.
- d WAGENINGEN, INSTITUUT VOOR TUINBOUW-
TECHNIEK.
Wervelwind Prof. Junior nevelspuit. (The
Wervelwind Prof. Junior mist sprayer.)
Beproeversrap. Inst. TuinbTech. No. 9/
2382, 1953, pp. 10, illus.

WEEDS AND WEED CONTROL.

General.

(See also 404a, b, e, f, 592, 1059.)

374. VAN DER GRAAF, A. J.
Onkruidbestrijding met chemische middel-
en. (Weed control with chemicals.)
Jaarb. "De Proeftuin" te Boskoop 1952, pp.
32-5.

DNC gave satisfactory control of broad-leaved weeds but had no effect on grasses. IPC prevented the appearance of grasses and chickweed for 7 weeks; groundsel and *Impatiens* were not completely controlled. NIX damaged many weeds but these usually recovered. A mixture of 0.66% IPC and 0.5% DNC prevented the appearance of grasses and chickweed for 7 weeks

and killed many broad-leaved weeds; it should be applied when the weeds first emerge.

375. ARROYAVE VARGAS, G.
Influencia de los diferentes herbicidas como
pre-tratamientos sobre la tierra. (Effect of
certain pre-sowing herbicides.)
Acta agron., 1953, 3: 209-28, bibl. 12, illus.

Experiments with various pre-sowing herbicides are described. Spraying from an aeroplane with equal proportions of 2,4-D acid and its Na salt at 15 lb. per ha. gave effective control of most weeds. The minimum interval necessary between spraying and sowing or planting the crop was 21, 14 and 14 days with french beans, tobacco and strawberries respectively.

376. WOODFORD, E. K.

The chemical control of undesirable roadside vegetation.

Reprinted from *Rds and Rd Constr.*, 1953, 31 (364): 90-3, bibl. 16, illus.

Roadside spraying in Great Britain and other countries is briefly reviewed, and the materials used, particularly 2,4-D, MCPA and 2,4,5-T, are discussed. For the control of roadside weeds two applications are considered to be the economic limit, one in April-May to catch the early growing weeds such as buttercups (*Ranunculus* spp.), cow parsley (*Anthriscus sylvestris*) and perennial nettles (*Urtica dioica*), and the other in July-August for the later flowering species, such as hogweed (*Heracleum spondylium*) and wild parsnip (*Pastinaca sativa*). In order to minimize the danger of drift and also to give sufficient coverage to dense vegetation, it is necessary to apply a coarse spray at the rate of about 100 gal. per acre. The advantages and disadvantages of chemical sprays as compared with mowing are set out.

377. SHARP, S. S., AND OTHERS.

Herbicide use of phenyldimethylurea.

Agric. Chemls, 1953, 8 (9): 56-7, 139, 141-2.

The new herbicide is reported to be specifically promising for deep-rooted perennial weeds.

378. MULLISON, W. R.

The effect of droplet size upon herbicide effectiveness of plant growth regulators.

Down to Earth, 1953, 9 (2): 11-13, illus.

Results of laboratory trials with 2,4-D applied to young bean plants indicate that within the droplet size and concentration used the herbicidal effect was determined solely by the amount of material applied. In the field, therefore, provided a good coverage of the weeds is obtained, whether small or large droplets are used would appear to be unimportant so long as the total amount of 2,4-D applied is the same. The part played by droplet size in physical selectivity of the herbicide was not considered in these tests.

379. DALLYN, S.

Herbicide action of oils.

Mem. Cornell agric. Exp. Stat. 316, 1953, pp. 43, bibl. 50, illus.

Studies emphasizing reasons for the various effects or responses rather than the effects themselves.

380. GARD, L. N., AND RUDD, N. G.

Herbicide determination. Isopropyl N-(3-chlorophenyl) carbamate (CIPC) in soils and crops.

J. agric. Food Chem., 1953, 1: 630-2, bibl. 4.

A method is described for determining micro-quantities of the herbicide in soil, cotton seeds, head lettuce, onions and sugar beets. J.S.

381. YOUNG, H. Y., AND GORTNER, W. A.

Microdetermination of 3-(p-chlorophenyl)-1,1-dimethylurea in plant tissue.

Analyt. Chem., 1953, 25: 800-2, bibl. 4.

The work was carried out on pineapple fruit tissue at the Pineapple Research Institute of Hawaii.

Biological control.

382. C.S.I.R.O., AUSTRALIA.

Biological control of weeds and pests.

A.R. C.S.I.R.O., Aust. 1951/52, 1952, pp. 64-5.

Notes are given on results obtained and investigations under way in Australia for the biological control of the weeds, St. John's wort (*Hypericum perforatum* var. *angustifolium*) and *Heliotropium europaeum*, and the pests, cabbage moth (*Plutella maculipennis*), cabbage butterfly (*Pieris rapae*), green vegetable bug (*Nezara viridula*) and Queensland fruit fly (*Dacus tryoni*).

Particular weeds.

383. RICHARDSON, J. M.

Creeping knapweed.

J. Dep. Agric. S. Aust., 1953, 56: 538-9, illus.

Centaurea repens, a serious menace to horticultural crops in South Australia, can be controlled by repeated spraying with 0.2% 2,4-D, or 2 lb. sodium chlorate in 1 gal. water at 1 gal. solution to 30 sq. yds.

384. KELLEY, W. R.

Study of seed identification and seed germination of *Potentilla* spp. and *Veronica* spp.

Mem. Cornell agric. Exp. Stat. 317, 1953, pp. 31, bibl. 34.

The data presented on the recognition of the seeds of weedy species of *Potentilla* and *Veronica* and their germination responses under different conditions are helpful in attacking weed control problems in grass crops, including lawns.

385. DAY, B. E.

Soil fumigation with chlorobromopropene for the control of nutgrass.

Hilgardia, 1953, 21: 593-604, bibl. 25, illus., being *Pap. Calif. Citrus Exp. Stat.* 750.

In laboratory experiments excised tubers of *Cyperus rotundus* placed in flasks containing vermiculite or soil were killed by fumigating with a commercial formulation containing 55% 1-chloro-3-bromopropene (CBP), added at the rate of 0.04 ml. per litre of confined space. Temperature had little effect but soil moisture in excess of three-quarters of field capacity restricted the movement of CBP vapour through the soil and imparted varying degrees of protection from the fumigant. In preliminary field trials 80 gal. of CBP formulation per acre, injected 8 in. deep, gave effective control of nutgrass on well-tilled soils of moderately low moisture content. Soil compaction reduced the effectiveness of the fumigant. [From author's summary. See also *H.A.*, 23: 4106.]

386. MUZIK, T. J., AND CRUZADO, H. J.

The effect of 2,4-D on sprout formation in *Cyperus rotundus*.

Amer. J. Bot., 1953, 40: 507-12, bibl. 15, illus.

In nutgrass (*Cyperus rotundus*) the apical bud inhibited sprouting in other buds on the same tuber, and the top tuber exerted a similar dominance over the lower tubers in the system. Dominance in the system is weaker than dominance in the tuber and may be overcome by inverting the system or aligning it hori-

zontally. New tubers are formed within 3 weeks after planting. Growth is entirely from preformed buds. Tubers separated from the chain or in chains with heat-killed rhizomes sprouted at equal rates. Light stimulated sprouting. It is suggested that a method of control of this weed pest should consist of measures designed to disturb the underground system as much as possible to induce maximum sprouting before treatment with 2,4-dichlorophenoxyacetic acid or some other systemic herbicide. [Authors' summary.]—Fed. Exp. Stat., Mayaguez, Puerto Rico.

Weed control in fruit crops.

387. WURGLER, W.

La végétation adventice des fraisières valaisannes. (**Weeds of strawberry plantations in the Valais, Switzerland.**)

Landw. Jb. Schweiz, 1953, 2 (n.s.): 917-24.

The author lists all the weeds recorded by him in strawberry fields in the Valais during the period 1949-52, noting whether he found them in plain or hill plantations.

388. DENISEN, E. L.

Controlling weeds in strawberries with sodium 2,4-dichlorophenoxyethyl sulfate.
Proc. Amer. Soc. hort. Sci., 1953, 61: 185-94, bibl. 7, illus., being *J. Pap. la agric. Exp. Stat.* J-2181.

Sodium 2,4-dichlorophenoxyethyl sulphate (E.H.1) was applied at rates of 2, 4, 6 and 8 lb. per acre to June bearing and everbearing varieties of strawberry during 1950, 1951 and 1952. Very effective control of broad-leaved weeds and annual grasses was obtained during the late spring and summer at the 3 higher rates. Yield increases were obtained with 4 varieties of everbearing strawberry, though this was apparently due to effective weed control rather than any stimulating effect of the herbicide. Treatment with E.H.1 caused some reduction in the number of rooted runners per plant. Labour needed for hand weeding was reduced by 76 to 88% by treatment with E.H.1. J.S.

389. HILL, R. G., Jr., AND ALBAN, E. K.

A comparison of the effects of the salt and ester formulations of 2,4-D upon the growth and yield of the Premier strawberry.
Proc. Amer. Soc. hort. Sci., 1953, 61: 195-200, bibl. 9.

During the three growing seasons 1949, 1950 and 1951, trials were carried out to compare the effects of the salt and ester formulations of 2,4-D, the time of application and the effect of multiple applications of 2,4-D on the Premier strawberry. The ester treatments resulted in yield and plant stands significantly lower than the salt treatments. During the first growing season from one to three applications of the salt formulation could be used without reducing yield, although there was some reduction in plant stand. The decrease in yield and plant stand due to 2,4-D ester became more pronounced as the number of applications was increased. An application of either formulation during the spring prior to the harvest season caused significant reduction of yield. J.S.

390. CLORE, W. J., AND BRUNS, V. F.

The sensitivity of the Concord grape to 2,4-D.
Proc. Amer. Soc. hort. Sci., 1953, 61: 125-34, bibl. 4, illus., being *Sci. Pap. Wash. St. agric. Exp. Stats* 1155.

To study the relative sensitivity of the Concord grape to 2,4-D, quantitative, positional and cluster applications of minute amounts were made in the field and in the greenhouse. Applications ranging from 0.0001 to 512 µg. all caused malformation. In the positional studies (with 16 µg. per treatment), the youngest open leaf at the tip of the shoot appeared to be the most sensitive, but treatment of the 2nd and 3rd leaves appeared to produce the greatest amount of malformation of the new growth. Typical symptoms of injury are described. Increased vigour of the plants resulted in greater sensitivity. Applications of 1-10 p.p.m. 2,4-D to the clusters during the closed-bud and flowering stages caused injury by inhibiting fruit set and development. J.S.

391. ROY, D.

Methods and practices for weed and brush control by the use of chemicals.
Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 72-6.

Notes on weed control in orchards and on chemical destruction of undesirable old orchard hedges.

Weed control in ornamentals and turf.

392. EASTWOOD, T.

Application of 2,4-D for weed control during the dormant and the active growing season for field grown daffodils.

Proc. Amer. Soc. hort. Sci., 1953, 61: 581-4.

Under the conditions of the experiment, the daffodil plant was able to tolerate reasonably large amounts of the triethanol amine salt of 2,4-D at various periods of its growth cycle. The best results were obtained from a heavy autumn application alone or a medium autumn treatment followed by a post-flower treatment. J.S.

393. RAVENSBERG, K.

Bespuitingsproef. (Spraying trials.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 35-6.

A test was carried out to determine the susceptibility of various woody ornamental plants to damage by DNC in mineral oil. The plants were sprayed with a 6% emulsion of Ditol (mineral oil + DNC) in sunny weather at a temperature of $\pm 18^\circ$ C. After several months no damage was observed. The 50 species tested are listed.

394. DAWSON, R. B.

Weed control in turf with special reference to selective weedkillers.

J. Inst. Corn agric. Merch., 1952, 3: 164-5.

Among materials recommended for the eradication of weeds are (1) a mixture of 3 parts of ammonium sulphate (or dried blood), 1 part calcined iron sulphate, and 10-20 parts carrier repeatedly applied at 4 oz. per sq. yd.; (2) MCPA at 2-6 lb. active principle per acre;

and (3) 2,4-D at 2-4 lb. per acre. These 2 latter compounds appear to be more effective in repeated sprayings at lower rates than single sprayings at heavier rates, are best applied in warm steamy weather between May and August, affect germination for 1-4 weeks, should not be applied to turf younger than 2-3 months old, are not satisfactory for moss control and are more effective as liquid applications (25-30 gal./acre) than as powders.

Weed control in sansevieria.

395. GANGSTAD, E. O., SEALE, C. C., AND JOYNER, J. F.

Preliminary studies in the use of herbicides for the control of weeds in sansevieria.

Weeds, N. York, 1953, 2: 113-18, bibl. 11, illus.

Foliage sprays of TCA, PCP and DNOSAP at rates required for satisfactory weed control were injurious to the sansevieria plants. Treatments with 2,4-D amine salt, DNOSBP ammonium salt and KCNO caused little injury but were ineffective against perennial grass weeds. Pre-planting treatments with TCA at 30 lb. per acre gave good results for several months, but did not offer a means of weed control where perennial grasses became established in the crop after planting. In such cases CMU applications were found to be satisfactory at rates recommended earlier [see *H.A.*, 23: 607].

Weed control in sugar cane.

(See also 965.)

396. ROCHECOUSTE, E.

Practical aspects of chemical weed control in sugar-cane fields in Mauritius.

Trop. Agriculture, Trin., 1953, 30: 178-82.

The results, without details, are summarized of weed control experiments that have been in progress in Mauritius cane fields since 1945. In general, pre-emergence treatment has given the best results in nearly all localities, the most satisfactory herbicide being sodium MCPA followed by sodium and amine 2,4-D; esters of 2,4-D have been less satisfactory. However, where perennial weeds are dominant, post-emergence treatment has given better results, the most satisfactory materials being sodium chlorate for a mixed population of annuals and perennials, sodium TCA for grasses, amine 2,4-D for *Cyperus rotundus* and esters of 2,4-D for perennial broad-leaved weeds. Factors found to affect the control of certain weed species are mentioned. The position occupied by chemical weed control in the programme of cane cultivation operations is indicated diagrammatically.

397. PENNEY, G. L.

Chemical weed control in plant cane.

S. Afr. Sugar J., 1953, 37: 513-17.

The progress made to date in South Africa is discussed with special reference to the use, separately or in combination, of 2,4-D and activated oil contact sprays. The cost of hand and mechanical weeding of plant cane ranges from 45s. to 85s. per acre, whereas chemical control has been effected for 51s. and should at most not cost more than 75s.

398. STAMPER, E. R., AND CHILTON, S. J. P.
Weed control in sugar cane.

Sugar J., 1953, 16 (3): 23-4.

Concise recommendations, based on 5 years' research at the Louisiana Agricultural Experiment Station, are made for the control of Johnson grass in fallow land, plant canes and ratoons. Control is based on a combination of cultural operations and spray applications of 2,4-D and TCA. Approximate costs are indicated. Brief notes are also given on Johnson grass control with sodium chlorate on headlands and ditch banks, chemical weed control in cane fields where Johnson grass is not a problem, and precautions necessary in the use of herbicides.

399. HAVIS, J. R.

Effect of 2,4-D sprays on the growth of young sugar cane.

Weeds, N. York, 1953, 2: 148-54, bibl. 5, illus.

The purpose of this investigation, conducted near Turrialba, Costa Rica, was to obtain information on the growth of sugar cane following the application of 2,4-D sprays to control the weeds that normally appear at the same time as the young cane. Weekly growth measurements showed that 1 lb. per acre did not affect the growth of 1-month-old plants. Rates up to 4 lb. were safe for 2-month-old plants. Application of 2 to 4 lb. per acre over the tops of 1-month-old plants caused reduction in growth, but similar amounts applied to the base of the plants were relatively safe.

Weed control in vegetables and tobacco.

400. LACHMAN, W. H.

Weeding set onions with Chloro IPC.

Proc. Amer. Soc. hort. Sci., 1953, 61: 496-8, bibl. 13, illus., being Contr. Mass. agric. Exp. Stat. 874.

Chloro IPC at the rate of 6 to 8 lb. per acre applied as a pre-emergence spray to set onions proved to be an excellent herbicide in these tests. The treatment suppressed the growth of weeds very satisfactorily for 9 weeks. Yields of onions from treated plots were neither adversely affected nor enhanced. [Author's summary.]

401. THOMSON, R., AND MCLEOD, A. G.

Use of methyl bromide for the control of weeds in tobacco seedling beds.

N.Z. J. Sci. Tech., Sect. A, 1953, 35: 146-51, bibl. 6.

In trials at the Motueka Station in 1950-51 and on growers' estates in 1952 methyl bromide gas applied (under Sisalkraft paper) at the rate of 1 lb. per 100 sq. ft. of bed area proved as effective as steam in controlling weeds and stimulating growth of tobacco in seedling beds. There were no toxic after effects.

402. IZARD, C., AND HITIER, H.

Obtention de la germination "in vitro" des graines de l'*Orobanche* du tabac. (Successful germination in vitro of seeds of tobacco *Orobanche*.)

C.R. Acad. Agric. Fr., 1953, 39: 567-9.

In biological studies on *Orobancha ramosa*, one seed germinated 3 weeks after the tobacco in tests in which *Orobancha* and tobacco seeds were germinated in the same test tube but without contact; this suggested that germination was due to some substance diffused by the tobacco roots. In 2 trials in which seed was treated for 24 hours with concentrations of nicotinamide (vitamin PP) ranging from 1 to 100 mg. per litre marked stimulation of germination occurred with the 10 mg. concentration. Vitamin B₆ at 1 and 10 mg./l. also clearly stimulated germination. Nicotine at 3 concentrations had no effect. It appears that a pyridine-based substance with vitamin properties is necessary for *Orobancha* germination.—Inst. exp. Tabac Bergerac.

Weed control in water.

403. SPRAY, J. R.
The control of weeds in boating lakes.
Park Admin., 1953, 18: 205-6.
After ineffective attempts had been made to control weed in a 6-acre lake by draining and removal of weeds by cutting, and by the use of various chemicals including sodium chlorate, copper sulphate and selective herbicides, sodium arsenite in the form of a proprietary weed killer was used. During the process of treatment and for two days afterwards the level of the lake was lowered so that no water reached the overflow. The weed killer was diluted in a tank and sprayed on the surface of the water in June when the weed was in full growth. Although there were no immediate apparent results, the treatment proved entirely successful with no poisoning of fish (perch) or bird life. The public are now encouraged to feed the ducks during the winter months, as the weedless lake can no longer do so.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(See also 5, 6, 8, 10, 43-46, 50, 52-55, 57-63, 65, 78, 80g, 364, 404c, 542c, k, v, 543b, c, d, g, o, 564, 1028, 1029, 1032, 1033, 1035, 1037, 1041-1044, 1046, 1047, 1053, 1056, 1061d, e.)

405. CAREW, J., AND WIEBE, J.
Newer vegetable varieties for 1953.
Cornell Ext. Bull. 880, 1953, pp. 8.
Beans, cabbage, carrots, celery, muskmelon, pepper, spinach, squash, tomato, watermelon.
406. NAPIER, C. L., AND GILLARD, S. O.
Less well-known vegetables that deserve a trial in the home garden.
N.Z. J. Agric., 1953, 87: 260-7, bibl. 2, illus.
Notes on culture, varieties and uses of borecole, celeriac, salsify, kohlrabi, globe artichoke, seakale, eggplant.
407. KROLL, R.
Les cultures potagères au Congo belge.
(Kitchen garden crops in the Belgian Congo.)
Bull. agric. Congo belge, 1953, 44: 533-96, and 821-56, bibl. 27, illus.
This paper is designed to assist amateur gardeners in the growing of European and native vegetables in the

Noted.

404.
a CRESCINI, F., AND SPREAFICO, L.
Piante coltivate contro erbe infestanti. I.—
Ricerca intorno alla biologia della germinazione degli acheni dell'*Artemisia vulgaris* L. (Cultivated plants versus weeds. I. Research on the biology of germination of the achenes of *Artemisia vulgaris*.)
[English summary ¾ p.]
Ann. Sper. agrar., 1953, 7: 1597-1610, bibl. 4, illus.
- b ELERN, S. J.
Commercial weed control in Israel.
Plant Prot. Overs. Rev., 1953, 4: 17-20, 25, bibl. 19.
- c HARDCASTLE, A. E., Jr.
Brush and weed control in fruit and vegetable crops.
Trans. Ill. St. hort. Soc. for 1952, 1953, 86: 275-9.
- d MINISTRY OF AGRICULTURE, LONDON.
The control of weeds in peas with dinoseb (DNBP).
Adv. Leaflet. Minist. Agric. Lond. 376, revised 1953, pp. 4.
Applied at 1-2 lb. per acre.
- e PETERSEN, H. I., AND HAMMARLUND, A.
Årsoversigt for Statens Ukrudtsforsøg 1952. (Annual Report of the Danish Institute for Weed Research for 1952.) [English summary pp. 1¾.]
Tidsskr. Planteavl., 1953, 56: 702-11.
- f SHAW, W. C., AND LOVVORN, R. L.
Recent advances in chemical weed control.
Agric. Chemls., 1953, 8 (5): 32-5, 127-9.

central Congo basin where the high rainfall, hot sun, high mean annual temperature and relatively short dry season are adverse factors. General recommendations on the establishment of a garden, cultural practices, propagation and pests and diseases are followed by notes on a wide variety of European vegetables, pot herbs and native vegetables.

408. CRANG, A., AND STURDY, M.
A comparison of some varieties of vegetables preserved by canning and by freezing.
Progress Report II.
A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 185-91, bibl. 1.

In tests on mushrooms and on 3 varieties of broad bean, 5 of dwarf or runner bean, 2 of carrot, 5 of pea and 3 of spinach, freezing gave products that were outstandingly better in colour and generally better in flavour than canning. The responses of each variety to both methods of preservation are indicated. An improved method of freezing mushrooms is described. [For previous report see *H.A.*, 22: 3776.]

409. MELIS, F.
Injertos entre especies de familias distintas. (Inter-family grafts.)
Rev. Fac. Cien. agrar. Mendoza, 1951, 3 (2): 31-7, illus.

The author has successfully grafted *Lycopersicon esculentum* on *Nicotiana glauca*, *Solanum melongena* on *N. glauca*, *Xanthium spinosum* on *Helianthus annuus* (but after some days a large swelling developed at the union), and members of the *Chenopodiaceae* on *Amarantaceae* and *vice versa*.

410. SHEETS, O.

Effect of growing conditions on nutritive value of vegetables.

Miss. Fm Res., 1952, 15 (5): 2-4.

The effect of fertilizers, soils, weather and place on mineral and vitamin content of vegetables has been estimated for some years by the Home Economics, the Horticulture and the Chemistry Departments of the Mississippi Agricultural Experiment Station. Observations on collards and turnips are discussed here. *Fertilizers*. Nitrogen had much the most satisfactory effect on mineral contents and on yields. It also increased carotene content but did not give consistent results as regards vitamin C. *Soils*. High organic soils produced turnip greens with an Fe content $2\frac{1}{2}$ times higher than did low organic soils. *Weather*. Seasonal effects on mineral and on vitamin content were considerable. *Place*. The place of production had more effect than any other factor on the mineral content of the vegetables studied. As regards vitamins, climate plus place seemed to be the chief factors.

411. TAYLOR, G. S., AND MARTIN, W. P.

Effect of soil-aggregating chemicals on soils.

Agric. Engng St. Joseph, Mich., 1953, 34: 550-4, bibl. 9.

In addition to observations on soil, the effect of soil-aggregating chemicals on the growth of crops, including tomato, carrot and lettuce, was tested. VAMA (a modified vinyl acetate-maleic acid compound) applied at 0.05 and 0.15% concentrations improved the yield and resulted in earlier maturity of field tomatoes. The same chemical applied at 2,000 and 4,000 lb. per acre increased carrot yields by 11 and 21% respectively as compared with the control. Lettuce appeared to be unaffected by soil treatment.—Ohio agric. Exp. Stat.

412. HILL, A. C., TOTH, S. J., AND BEAR, F. E.

Cobalt status of New Jersey soil and forage plants and factors affecting the cobalt content of plants.

Soil Sci., 1953, 76: 273-84, bibl. 10.

Although primarily concerned with the cobalt content of soils and forage plants in New Jersey and with the effects of lime in reducing the availability of soil Co and of Mn and Fe in reducing Co uptake by plants, this paper lists the mean Co content found in various crops including pepper, spinach, beet, cabbage, carrot, lettuce, cauliflower and onion. The tops of some vegetables, notably of peppers, spinach and beets, were high in Co, and their underground portions relatively low in Co.

413. COOKE, G. W., AND WIDDOWSON, F. V.

Placement of fertilizers for row crops.

J. agric. Sci., 1953, 43: 348-57, bibl. 3.

A continuation of earlier experiments [see *H.A.*, 20: 2278 and 23: 3075] showed that the yields of peas and beans given a single dressing of placed fertilizer in a band 3 in. below the soil surface and 2 in. to the side of the seed were equal to, or greater than, those of

plants given double dressings of broadcast fertilizer. The use of suitable drills should, it is thought, be profitable to farmers growing appreciable acreages of peas, beans and rapidly maturing horticultural crops. No advantage was gained by placing fertilizer at the side of, and in contact with, the seed in the case of carrots, kale or beet. Placed fertilizer gave a higher yield of spinach than broadcast fertilizer. The designs used and the data obtained are discussed.

414. NYHLÉN, Å.

Gödslings- och bevattningsförsök med köksväxter vid Nyckelby. (Manurial and irrigation trials with vegetables at Nyckelby.)

[English summary 1 p.]

Medd. Trädgårdsförs. Malmö 84, 1953, pp. 17, bibl. 10.

Manuring. (a) Sewage sludge, at the rate of 300 kg. per 100 m.², and (b) the same mixed with granulated sphagnum peat were compared with (c) granulated peat, (d) stable manure, (e) artificial fertilizers, and (f) control, the test plants being cabbage and beetroot. Average cabbage yields over a period of 3 years (1943-45) were 449, 459, 337, 366, 527 and 328 kg./100m.² and average beetroot yields 269, 268, 235, 241, 279 and 220 kg./100m.² for (a), (b), (c), (d), (e) and (f) respectively. *Irrigation*. Eight vegetables tested in 1942-43 benefited from irrigation applied from June to August to supplement rainfall to the level of 100 mm. per month. In combined *manurial and irrigation* trials, carried out in 1944-46, sewage sludge plus peat proved superior to artificials for peas, while kale, cauliflower and beetroot gave higher yields with artificial fertilizers. Kale and leeks failed to respond to irrigation.

415. LAND, W. B., AND CARREKER, J. R.

Results of evapotranspiration and root distribution studies.

Agric. Engng St. Joseph, Mich., 1953, 34: 319-22, illus.

Methods of measuring moisture withdrawal from the soil, important for assessing irrigation requirements, are discussed, and experiments conducted in Georgia with irrigated and unirrigated tomatoes, pole beans and 2 agricultural crops are described. The average daily rates of evapotranspiration were 0.187 in. for tomatoes and 0.185 in. for beans; maximum daily rates were 0.310 and 0.320 respectively. The average yields per acre with and without irrigation were: 18,915 and 6,452 lb. for tomatoes, and 5,183 and 541 lb. for beans. Root measurements were made only on the agricultural crops.

416. EVENARI, M., NEUMANN, G., AND STEIN, G.

Factors modifying the influence of light on germination.

Nature, 1953, 172: 452-3, bibl. 7.

From a series of investigations, the last of which is reported here, on the effect of light on the germination of lettuce seed, it is tentatively concluded that the operation of two mechanisms determines the percentage of germination. One of these is not affected by light and operates up to the limit below which the percentage of germination cannot be reduced by light alone. The other mechanism is the light-sensitive one responding to the opposing effects of red and infra-red and operates up to the temperature-dependent upper

limit beyond which germination cannot be increased by light alone. The effect of infra-red irradiation on "dark" seeds is then due to the existence to some extent of the light-sensitive system in the "dark" seeds, possibly owing to the fact that even before imbibition these seeds contain moisture in equilibrium with the moisture content of the air. The interpretation of the results obtained with lettuce is believed to have a more general application.—Hebrew University, Jerusalem.

417. HORI, Y., AND SUGIYAMA, T.

Germination of vegetable seeds under various concentrations of oxygen and carbon dioxide.

[Japanese, with English summary $\frac{1}{2}$ p.]

J. hort. Ass. Japan, 1953, 22: 72-80, bibl. 6, illus.

Of the species tested cucumber and onion germinated in the lowest concentrations of O_2 , the former germinating as well at over 20% and under 1% as in a normal atmosphere and the latter as well at over 50% and under 2% as in a normal atmosphere. Celery and radish, which required more O_2 than any of the other species, showed no or poor germination at under 5% O_2 . Chinese cabbage, turnip, garland chrysanthemum, mustard, pepper, tomato, carrot, cabbage, squash and burdock in that order were intermediate in their capacity to germinate in low O_2 concentrations. The inhibitory effect of CO_2 in a 15% O_2 atmosphere was clearly recognizable only at the highest concentration (40% CO_2), but in a 5% O_2 atmosphere germination was decreased and retarded markedly, and browning of roots and root tips was often induced, by the higher CO_2 concentrations. With 40% CO_2 in 15% or 5% O_2 , onion and Chinese cabbage germinated nearly as well as with nil CO_2 , but carrot, radish and squash germinated poorly even with 20% CO_2 in 15% O_2 . Low CO_2 and especially low O_2 plus CO_2 induced in cruciferous and other seeds a kind of dormancy that could be broken by low temperature treatment.

418. ANON.

Small man's vegetable planter launched.

Comm. Grower, 1953, No. 3015, p. 695, illus.

A new vegetable planting machine, capable of planting brassicas, lettuces, celery and various nursery stock, is described. Twelve spacings are available, ranging from $7\frac{1}{2}$ to 48 in. The planter can be coupled to the toolbar of a tractor, either singly or ganged, and the planting speed averages from 1,200 to 1,500 sets an hour. The price is £27 10s.

419. BEAN, G., AND KEMP, I.

The development of a universal vegetable washing machine of medium output. II. Continuous belt type, incorporating a pre-wetting section.

Case Study nat. Inst. agric. Engng 18 (Part II), 1953, pp. 16, illus.

Various conclusions arising from Case Study 18 (Part I), which dealt with the construction and use of a circular vegetable washing machine [see *H.A.*, 23: 3028], have been taken into account in the design of the "straight through" washer described here. This study includes an account of the stages of development of

the new machine, details of its main components, its horse-power requirements and its use for washing vegetables. Throughputs per hour recorded include, beetroot $1\frac{1}{2}$ -3 tons or 2,500 bunches, brussels sprouts 1 ton, carrots 2-3 tons or 750-1,000 bunches, celery 700-1,000 heads, self-blanching celery 1,500 heads, leeks 1,000 lb. and parsnips 1-2 tons.

420. DUNN, J. S.

Report on test of the Cooch vegetable washing machine.

Rep. nat. Inst. agric. Engng 79, 1953, pp. 16, illus.

The following, among other, conclusions are drawn from tests on this machine: The machine successfully washed a wide variety of crops, although the standard of washing in the case of bunched carrots and green onions was not satisfactory. The machine was easy to operate, was compact, could be moved easily, and needed little adjustment when changing from one crop to another. Except where sorting was necessary, the labour requirement was usually 3 men. Throughputs were satisfactory, examples being self-blanching celery 18.9 cwt. per hr, loose carrots 30.5 cwt. The standard of construction was good. Certain modifications were suggested, and the manufacturers indicate the actions subsequently taken to meet these suggestions.

421. WALLIN, V. R., AND SKOLKO, A. J.

Treatment of vegetable seed of low germination.

Plant Dis. Repr., 1953, 37: 66-8, bibl. 3, being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric., Ottawa* 1247.

Among various dust and liquid fungicidal seed dressings tested on a wide variety of vegetable seeds, some several years old, panogen (methyl mercury dicyan diamide) and phygon (dichloronaphthoquinone) were particularly effective in most cases where the germination of untreated seed was low. All the other disinfectants tested also significantly improved germination in certain cases.

422. JACKS, H.

Disinfection of vegetable seeds.

N.Z. J. Agric., 1953, 87: 217-24, illus.

Detailed instructions are given for the disinfection of different vegetable seeds by dusting, slurry treatments and hot water treatments, and certain special treatments applied to tomato, onion and celery seeds are described briefly. Various seed-dusting and slurry machines are illustrated.

423. DE ZEEUW, A.

Parasitaire bodemorganismen in gecomposteerd organisch materiaal. (Parasitic soil organisms in composted organic material.)

[English summary 3 lines.]

Meded. Dir. Tuinb., 1953, 16: 689-92, bibl. 6.

Trials with tomato and cucumber indicated that during the composting process of garden refuse *Fusarium oxysporum* probably retains its infectivity whereas *Heterodera marioni* is destroyed and tomato mosaic virus is inactivated.—Proefstat. Groenten- en Fruitteelt Naaldwijk.

424. HOWLES, R.

Virus diseases; therapy.

A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 26-33, bibl. 2.

Notes are given on heat treatments, either hot air or hot water, to destroy virus within infected tomato seed, chrysanthemum stools and rooted cuttings and arum lily corms. Of a number of chemicals applied for the control of chrysanthemum mosaic only 2,4-D offered any promise as a therapeutic agent. The effects of 2 kinds of radiation on the virus content of virus-infected tomato seeds and on the seeds themselves were determined. Supersonic radiation had no effect on the virus content but short-wave radiation reduced the lesion count to 69%; this means a much greater reduction in virus content. There was little effect on the seed itself.

425. DAWSON, E. H., AND OTHERS.

Flavor of selected vegetables grown in soil treated with isomers of benzene hexachloride.

J. agric. Food Chem., 1953, 1: 399-403, bibl. 9.

Studies were made to determine the effect on flavor of tomatoes, lima beans, potatoes, radishes, and carrots from use of purified gamma, alpha, beta, and delta isomers of benzene hexachloride, a mixture of these isomers, commercial gamma isomer and lindane as insecticides in growing the vegetables. The results indicate that flavor may be affected by certain formulations of benzene hexachloride; the effect on flavor varies with the formulation, the dosage rate and the type of vegetable grown. [Authors' summary.]

426. BECKHAM, C. M.

Biology and control of the vegetable weevil in Georgia.

Tech. Bull. Ga Exp. Stat. 2, 1953, pp. 36, bibl. 63, illus.

The weevil *Listroderes costirostris obliquus* attacks a large number of vegetables, tobacco and many wild plants. In field experiments using insecticides in the form of dusts against the larvae, the most effective materials, which gave better than 90% control, were 2.5% aldrin, 0.5% parathion, 5% chlordane and 3% lindane. DDT used at 2 and 5% gave 60 and 85% control, respectively; lead arsenate gave only 70% control. In laboratory tests against the adults chlordane, aldrin, parathion and lindane were 100% effective. Chlordane and aldrin applied to the soil at 5 lb. per acre were found very satisfactory against the larvae. The parasitization of weevil adults by *Hyalomyodes triangulifera* is mentioned and the importance of combining chemical control with correct cultural practice is stressed.

427. VAN RENSBURG, W. J. C.

The packing, handling and railing of fruit and vegetables.

Fmg S. Afr., 1953, 28: 221-2, 231.

Small-scale experiments were carried out on the long-distance rail transport of cabbage, green beans, green peas, tomatoes and papaws. The results emphasize the importance of careful handling and of cooling before packing. It was found that if the product is cool on being loaded the temperature in the truck will not rise in transit.—Div. Econ. Markets, Johannesburg.

Asparagus.

(See also 542q, 658.)

428. DE RAVEL, G.

La culture de l'asperge sous serre en Vaucluse. (Growing asparagus under glass in Vaucluse.)

Rev. hort. Paris, 1953, 125: 934-7, illus.

Vaucluse is one of the main asparagus growing districts of France. Subjects covered are soils; irrigation, 2 furrow irrigations in February, 8 in March, 2 in April and 5 from May to September; manuring, farmyard manure, concentrates and a complete fertilizer before planting, complete fertilizer alone in the second year, from the third year, when forcing begins, cake and complete fertilizer applied in November before earthing up and in April after levelling; planting, the trenches are 1.6 m. apart, 0.25-0.3 m. broad and of the same depth, the crowns are planted 0.25 m. apart in quincunx formation, equivalent to 23,000-24,000 per ha. and are covered with 5-6 cm. of earth, earthing up occurring in November of the 3rd year; Dutch lights, erected in December of the 3rd year, covering 5-6 rows and up to 180 m. long; harvesting, yields (1.2-1.5 kg. per m. of row but up to 2-3 kg. in young plantations on new soil; and control of the common pests and diseases.

429. KAHN, R. P., AND OTHERS.

An investigation of asparagus rust in Illinois.

Bull. Ill. agric. Exp. Stat. 559, 1952, pp. 56, bibl. 54, illus.

Although none of the varieties or selections of asparagus tested were commercially resistant to rust, *Puccinia asparagi* [see also *H.A.*, 22: 2542], a marked difference was found in their degree of susceptibility. Early American and European varieties appeared to be more susceptible than any of the collections of the Washington variety, and if rust-resistant plants are found it is most likely to be in Washington stock. Protectant fungicides were not effective in controlling rust, but an eradicant, dinitro-o-cresol, used at a high rate of application (800 gal. per acre), reduced the number of aecia and thereby postponed the spread of rust until late in the growing season; it did not, however, prevent late outbreaks of rust.

Brassicas.

(See also 26, 542e, m, o, r, 543j.)

430. SCIARONI, R. H., AND OTHERS.

Brussels sprouts production in California.

Circ. Calif. agric. Exp. Stat. 427, 1953, pp. 16.

Notes are given on planting, growing including control of pests and diseases, harvesting, and preparing for market. The chief variety is a selection of Half Dwarf.

431. FAJARDO, P. S.

Cauliflower growing in Los Baños.

Philipp. Agric., 1952, 36: 90-5, illus.

Cauliflower, hitherto grown only in a few places like Baguio and Trinidad Valley, was planted in horticultural projects of the U.P. Rural High School at Los Baños. The conditions and results of the two-year planting are here described. [Author's summary.]

432. IWAMA, S., AND SERIZAWA, M.
Ecological studies of vegetables at the regions of different altitudes. 4. Ecological behaviour of spring-sown Chinese cabbages. [Japanese, with English summary $\frac{1}{2}$ p.] *J. hort. Ass. Japan*, 1953, 22: 87-94, bibl. 6, illus.

In experiments conducted in 1951 and 1952 to determine the effects of temperature on flower cluster differentiation, flower stalk development, vegetative growth and susceptibility to disease in spring-sown Chinese cabbage, 2 varieties were sown in the open at 360 m. and 1,390 m. or were planted out after being raised in a hotbed maintained above 10° C. Cabbages sown or planted out at a minimum temperature of below 8-9° C. bolted; 30 days elapsed between sowing and flower cluster differentiation and 20-30 more before the early bolting variety bolted; perfect heads were obtained before the late bolting variety bolted if other conditions were favourable. In the first 30-40 days after sowing vegetative growth was somewhat slow and plants were not very sensitive to temperature; thereafter growth became much quicker and plants were sensitive to temperature and susceptible to disease. The optimum mean temperature for growth was 18-21° C.

433. PERSSON, A. R., AND REVHAUG, H.
Stokkløping hos Ditmarsker. (Bolting in the cabbage variety Ditmarscher.) *Gartneryrket*, 1953, 43: 743-4, illus., being *Retl. Inst. Grønsakdyrk. Norg. Landbr.-Høgsk.* 3 (n.s.).

Bolting in the early cabbage variety Ditmarscher was prevented by sowing in March instead of February. The results of one year's trials are tabulated.

434. AGARWALA, S. C., AND HEWITT, E. J.
The effects of some different nitrogen sources on the molybdenum requirements of cauliflower plants grown in sand culture. *A.R. Long Ashton agric. hort. Res. Stat. for* 1952, 1953, pp. 195-9, bibl. 11, illus.

The results of further studies on the inter-relationships between nitrogen from different sources and molybdenum in the nutrition of cauliflower plants confirm those obtained previously [see *H.A.*, 22: 3788] and provide additional information on certain points.

435. WARING, E. J.
Some problems in cauliflower growing. *Agric. Gaz. N.S.W.*, 1953, 64: 466-70, bibl. 6, illus.

This article, based partly on Australian experience and partly on overseas literature, deals with bark rot in waterlogged sites, seedbed drainage, and injuries due to B deficiency. For the last 8-10 lb. borax per acre is recommended; the effect lasts at least 2 years.

436. STOREY, I. F., AND GODWIN, A. E.
Cauliflower mosaic in Yorkshire, 1950-1951. *Plant Path.*, 1953, 2: 98-100.

The virus infection was derived partly from the seedbed and partly from diseased brassica plants growing in the vicinity. The former appears to be the more dangerous as most growers save their own seed. Much of the latter infection is taken up by the outside rows. An intervening

crop, such as rhubarb, appeared to have some screening effect. J.S.

437. BROADBENT, L., AND TINSLEY, T. W.
Symptoms of cauliflower mosaic and cabbage black ring spot in cauliflower. *Plant Path.*, 1953, 2: 88-92, bibl. 5, illus.

Details are given of progressive symptoms of the diseases and the influence of temperature and manuring. J.S.

438. MORETON, B. D., LIGHT, W. I. ST. G., AND JOHN, M. E.
Experiments on the control of cabbage root fly. *Plant Path.*, 1953, 2: 82-4.

Pilot experiments were carried out in Sussex and Kent in 1952 to investigate the concentrations of a number of modern insecticides required for effective control of cabbage root fly (*Erioischia brassicae*) when used in root dips or in spraying along the rows. Suspensions of gamma-BHC, dieldrin and toxaphene wettable powders were used as root dips and all gave good control of the fly at 0.5 and 1% concentrations. Higher concentrations caused some root damage. In row spraying gamma-BHC at 2.3 lb. in 460 gal. water per acre and at 2.3 lb. in 230 gal., and aldrin and dieldrin at 2.3 lb. in 230 gal. gave good results. Parathion was ineffective. Relative costs of the treatments are also given. The cost of gamma-BHC, used as a 0.5% root dip, would be about 24s. per acre compared with about £10 per acre as a row spray. The cost of toxaphene used as a 0.5% root dip would be between 4s. and 5s. J.S.

439. DOSSE, G.
Versuche zur Bekämpfung von Kohlschädlingen (*Chortophila brassicae* Bche. und *Blaniulus guttulatus* Bosc.). (Experiments on the control of the cabbage pests *Chortophila brassicae* and *Blaniulus guttulatus*.) *Anz. Schädlingsk.*, 1953, 26: 6, from abstr. in *PflSch. Ber. Wien*, 1953, 11: 23.

One application of a BHC preparation gave satisfactory results against a simultaneous infestation by both pests.

440. Vos, H. C. C. A. A.
Introduction in Indonesia of *Angitia cero-phaga* Grav., a parasite of *Plutella maculipennis* Curt. [Indonesian summary 1 p.] *Contr. gen. agric. Res. Stat. Bogor* 134, 1953, pp. 32, bibl. 27, illus.

The leaf-eating caterpillars of *Plutella maculipennis*, the diamond-back moth, do serious damage to cabbage in Indonesia. Detailed studies are reported on the life-cycle of the moth and on the life-cycle, breeding and liberation of the introduced parasite, *Angitia cerophaga*. Where cabbage had been grown from cuttings and had not been treated heavily with DDT, the liberation of *Angitia* resulted in 86-89% parasitism of *Plutella* cocoons. Results with cabbage raised from seed and heavily treated with insecticides were, however, unsatisfactory.

Celery.

(See also 542j.)

441. POPE, D. T., AND MUNGER, H. M.
The inheritance of susceptibility to boron deficiency in celery.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 481-6,
bibl. 3, illus.

It appears that heredity is involved in varietal responses of celery to low levels of boron. Susceptibility to B deficiency is conditioned by a single recessive gene.—Cornell Univ. J.S.

442. POPE, D. T., AND MUNGER, H. M.
Heredity and nutrition in relation to magnesium deficiency chlorosis in celery.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 472-80,
bibl. 8, illus.

Certain celery varieties grown on some organic soils in New York have shown marked chlorosis while others on the same soils have developed normally. The chlorotic plants recovered when sprayed with magnesium sulphate solutions. Crosses between the two types indicate that the normal condition is dominant and that a single gene conditions the utilization of magnesium.—Cornell Univ. J.S.

Cucurbits.

(See also 75, 542d, n, 543p.)

443. MANN, L. K.
Honey bee activity in relation to pollination and fruit set in the cantaloupe (*Cucumis melo*).
Amer. J. Bot., 1953, **40**: 545-53, bibl. 5.

Previous studies have suggested that field-grown powdery mildew resistant cantaloupe No. 45 drops fewer pollinated flowers when open-pollinated than when hand-pollinated. This was confirmed in the present study. The per cent. of fruit set from hand and open pollinations in four tests was, respectively: 39 vs. 67; 60 vs. 91; 30 vs. 50; and 48 vs. 78. It was shown further that set was much more uniform from day to day for open than for hand pollination. Open-pollinated flowers produced large fruit and more seed than hand-pollinated flowers. In the open, honey bees are the principal pollinating insects. Studies of bee activity on cantaloupe flowers showed that each flower was visited repeatedly during the one day it remained open. During this day perfect flowers were visited an average of 53 times and staminate flowers 42 times. This frequency difference may be associated with the larger corollas of perfect flowers; these averaged 1.3 times the diameter of corollas of staminate flowers. Bees remained on perfect flowers an average of 1.5 times as long as on staminate flowers. Individual perfect and staminate flowers produced about equal quantities of pollen, ranging from 8 to 13 thousand grains. During the day bees removed all but 2 thousand of these pollen grains. Pollen removal was most rapid during the morning hours. In hand pollination the flowers are usually pollinated but once, are injured by emasculation, and, in the control tests presented here, were pollinated with pollen from the same plant. In a series of experiments on the above techniques, flowers which were hand-pollinated 3 times set no more fruit

than when pollinated once; mutilated flowers left for open pollination gave significantly higher set than those hand-pollinated, and less, but not quite significantly so, than uninjured open-pollinated flowers; and flowers cross-pollinated by hand set no more fruit than when self-pollinated. [Author's summary.]—Univ. Calif., Davis.

444. OGAWARA, K., AND WATANABE, I.
Studies on the germination of squash seeds. I. On the relation of light to the germination of *Cucurbita maxima* Duch. seeds. [Japanese.]
J. hort. Ass. Japan, 1953, **22**: 45-9, bibl. 5, illus.

While it is known that germination of seeds is hindered by light in both *Cucurbita pepo* and *C. moschata*, a complicated result was obtained in experiments with *C. maxima*. The seeds of *C. maxima* germinate very poorly when they are exposed to light throughout the whole period, and germinate better, but still with a low percentage, in darkness. To attain the maximum rate of germination the seed needs first light and then darkness. When the periods of light exposure and darkness are the same, interrupted exposure is more favourable for germination than continuous exposure. It is shown that light of the same wavelength can affect germination either favourably or unfavourably. Y.A.

445. CHESHUNT.
Cucumbers.
A.R. Cheshunt exp. Res. Stat. 1952, 1953,
p. 20.

From the results obtained it is concluded that steam-sterilized virgin soil is as good as unsteamed virgin soil for cucumber beds, and that a first top dressing of bone meal as soon as the plants are established is adequate and no crop increase is produced by adding other nutrients at this stage.

446. SÜSSBRICH, H.
"Warmer Fuss" bei Treibgurken ohne Pferdemit. (Provision of heat for glasshouse cucumbers without using horse manure.)
Gartenwelt, 1953, **53**: 75-6, illus.

A hot bed, 25 cm. high, 50 cm. wide and 25 m. long, made up of 350 kg. straw+65 kg. calcium cyanamide+12 cartloads of peat, increased soil temperature in a heated cucumber house by an average of 2°C. and air temperature by 4° C. The first cucumbers from treated plants were cut 6 days earlier than from the controls grown in an adjacent glasshouse and the profits (specified) were considerable.

447. KLEIN, K. F.
Beregnungsversuche bei Treibgurkenkulturen. (Experiments on the irrigation of glasshouse cucumbers by sprinkler.)
Tech. Bauern Gärt. Ausg. G., 1953, **5**:
156-7, 177-8, bibl. 4.

Experiments with several models showed that sprinkler irrigation does not adversely affect glasshouse cucumbers. Humidity was more easily regulated than with hand watering and the saving in labour cost was considerable.—Bonn Univ.

448. VRIEND, S.
Zaadkomkommers als gevolg van bestuiving door bijen. (Seed cucumbers as a result of pollination by bees.) [English summary 8 lines.]

Meded. Dir. Tuinb., 1953, **16**: 811-16, illus.

Investigations have proved conclusively that honey bees are very largely responsible for the high percentage of fertilized cucumbers that are obtained in Holland. There appeared to be no varietal differences involved. It is concluded that legislation to prevent the keeping of bees in the cucumber growing areas during May-August is justified.

449. BEECHER, F. S.
Control of leaf diseases of cucumber.
Market Grs' J., 1953, **82** (10): 28-9.

The author deals with angular leaf spot, downy mildew and anthracnose, giving specific remedies for each. If, however, they all appear, then leaf spot can be sharply checked by 2 or 3 applications of a copper fungicide. Downy mildew appears later and both for it and anthracnose zineb or ziram will be found to check but not entirely control the troubles.

450. READ, W. H., SMITH, R. J., AND HUGHES, J. T.
Cucumber mildew control.
A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 49-51.

In screening trials, cucumber mildew (*Erysiphe cichoracearum*) control by karathane (containing 25% 2:4-dinitro-6-caprylphenyl crotonate) was superior to that given by copper oxychloride-petroleum emulsion spray. Very promising results were also obtained by phygon (containing 50% 2:3-dichloro-1:4-naphthaquinone). In greenhouse tests, a copper-petroleum spray was found more effective and generally more practicable than dithane Z 78 (zineb).

451. CONROY, R. J.
Fusarium foot rot of cucurbits in New South Wales.
J. Aust. Inst. agric. Sci., 1953, **19**: 106-8, bibl. 10, illus.

This note records the occurrence in the field in New South Wales of *Fusarium* foot rot of *Cucurbita maxima* and *C. pepo*. The economic importance of the disease appears to depend primarily on the amount of infected seed distributed. Inoculation experiments by several workers are reported, in which varieties of many cucurbit species have been tested for their susceptibility to the fungus.

452. WILLIAMS, P. H.
Black stem rot of cucumbers.
A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 25-6.

Isolated cases are reported of black stem rot of cucumbers, due to *Mycosphaerella citrullina*, the cause of a similar disease of melons and other cucurbits in the United States. The infections appeared late in the season, indicating that susceptibility of cucumbers to the fungus increases with the age of the plant, and it seems possible that black rot may be confined to older plants weakened by bearing a crop. For control, destruction of infected haulms, spraying of houses with formaldehyde and soil sterilization are recommended.

453. CROSSAN, D. F., HAASIS, F. A., AND ELLIS, D. E.
Phytophthora blight of summer squash in North Carolina.
From abstr. in *Phytopathology*, 1953, **43**: 469.

An account is given of the distribution, symptoms and effects of a leaf and stem blight of summer squash (*Cucurbita pepo* var. *condensa*) due to a fungus tentatively identified as *Phytophthora capsici*.

454. EBELING, W.
Laboratory experiments on the control of three species of fruit flies (Tephritidae).
EBELING, W., NISHIDA, T., AND BESS, H. A.
Field experiments on the control of the melon fly, *Dacus cucurbitae*.
Hilgardia, 1953, **21**: 515-62, bibl. 11, illus., and 563-92, bibl. 10, illus.

The first paper describes laboratory tests at the University of Hawaii of 26 insecticides against *Dacus cucurbitae*, *D. dorsalis* and *Ceratitis capitata*.

In the second paper field experiments on the control of the melon fly in Hawaii are described, which showed that, owing to the habits of the insect, treating the crop itself, even with insecticides that were highly effective in the laboratory, was useless. By contrast, treating a one- or two-row border of corn planted around the crop field once a week, or twice if it rained, with high concentrations of DDT, methoxychlor, aldrin, dieldrin, EPN or parathion wettable powders gave effective protection to cucumbers, watermelons and tomatoes. In laboratory cage tests for effectiveness of residues, parathion and chlordane lost effectiveness more rapidly than the others. The tests also indicated wide differences among insecticides in the toxicant concentration required for good control.

455. GURLEV, A. S., AND PLATONOVA, E. M.
Autumn prophylactic measures for the control of spider mites on cucumbers.
[Russian.]

Sad i Ogorod, 1953, No. 10, pp. 21-2, illus.

Cucumber frames, after clearance of the crop, should be sprayed with 4-5 c.c. NIUIF-100 [thiophos] and 200 c.c. formalin in 10 l. water, or 500 c.c. formalin in 10 l. water, the spray being applied at the rate of 1.5-2.0 l. per frame. The frames should be closed for 1-2 days, then cleaned, all waste removed and the spraying repeated. In addition to reducing spider mite infestation on the next season's crop, the treatment is said to control mildew.

456. MICHELbacher, A. E., MIDDLEKAUFF, W. W., AND BACON, O. G.
Cucumber beetles attacking melons in Northern California.
J. econ. Ent., 1953, **46**: 489-94, bibl. 3, illus.

The western spotted cucumber beetle, *Diabrotica undecimpunctata*, and the western striped cucumber beetle, *Acalymma trivittata*, are serious pests of melons. The types of injury they cause are described and illustrated. Control measures, similar to those suggested in an earlier work discussing mites and insect pests of melons [see *H.A.*, 23: 738], should be applied as soon as an adult cucumber beetle population becomes noticeable. [See also *H.A.*, 23: 4216.]

Legumes.

(See also 21, 27-30, 32, 34, 38, 39, 41, 70, 75, 365, 369, 404d, 500, 542 l, p, s, z, 543 l.)

457. HAGEDORN, D. J.
The New Era canning pea.
Bull. Wis. agric. Exp. Stat. 504, 1953, pp. 8, illus.

A description is given of the development and characteristics of this new canning pea variety, which is resistant to wilt, *Fusarium oxysporum* f. *pisi* r. 1, near-wilt, *F. o. f. p. r.* 2 and bean mosaic 2. [See also *Phytopathology*, 1953, 43: 473.]

458. ALLARD, R. W.
Production of dry edible lima beans in California.
Circ. Calif. agric. Exp. Stat. 423, 1953, pp. 27, illus.

The exacting climatic needs of standard lima beans are found in only one area of the U.S.A., namely the equable climate of the strip, rarely more than 10 miles wide, along the coast of southern California. Baby limas are less exacting and will thrive in the hot dry interior valleys of California. This bulletin contains an account of their cultivation and problems.

459. DEZEEUW, D. J., AND ANDERSEN, A. L.
Lima bean seed treatment trials in Michigan, 1951-52.
Plant Dis. Repr., 1953, 37: 69-70, bibl. 9, being *J. Art. Mich. agric. Exp. Stat.* 1440.

Various fungicides as dusts, liquids or slurries, providing 11 or more treatments in all, were tested in 2 seasons on Fordhook 242 lima bean seeds. In 1951 when untreated seed produced a 44.4% stand, only Arasan S.F. slurry, Cerasan M slurry and Panogen liquid significantly increased stands. In 1952, however, when the stand from untreated seed was only 21.0%, all treatments except one increased stands significantly.

460. TRESCH, —.
Das Verhalten einiger Buschbohnen sorten zu verschiedenen Beizmitteln. (The response of some dwarf bean varieties to several seed disinfectants.)
Saatgut-Wirtsch., 1953, 5: 202.

The responses of 5 bean varieties to several seed disinfecting fungicides and one insecticide are tabulated and graphically illustrated. It appears that the germination of the stringless varieties tested is more seriously affected by the treatment than that of the less exacting stringy varieties. The experimental Bayer chemical, UT, was found to stimulate germination.—Rhein. Lehr-u. Versuchsanst. f. Gemüse-u. Obstbau, Straelen.

461. D'AMATO, F.
Ritardi e aberrazioni di sviluppo in plantule e piante ottenute da seme invecchiato di pisello. (Slow and abnormal development in seedlings and plants from old pea seed.)
Colt. Giorn. vinic. ital., 1953, 7: 259-60, from abstr. in *Not. Mal. Pianta*, 1953, No. 23, p. 49.

The germination rate of 1946 pea seed was low compared with that of 1952 seed tested at the same time. The seedling survival rate was also low due to deaths in the first few days after germination. The majority of

1946 survivors showed atrophied rootlets and owed their survival to the production of adventitious roots from the epicotyl, the hypocotyl or, more rarely, the stump of the atrophied rootlets.

462. SHUKLA, T. C.
Vernalisation response in *Lens esculenta* Moench.
Curr. Sci., 1953, 22: 279-80, bibl. 1.

The vegetative phase in the lentil variety 4315-I was shortened by 3 weeks by soaking seeds for 24 hours and then holding them for 32 days at 6°-9° C. before sowing. Shorter periods of low temperature treatment were significantly less effective.

463. WATANABE, H.
Studies on the unfruitfulness of beans. (2) Influence of temperature on flower bud differentiation and blooming. [Japanese, with English summary $\frac{1}{4}$ p.]
J. hort. Ass. Japan, 1953, 22: 100-6, bibl. 22.

Experiments with Low's Champion beans showed that long-sustained high temperature (30° C.) and high night temperature before pollen mother cell reduction division resulted in abnormal flowers, most of whose pollen was abortive, and that low night temperature (15° C.) was favourable to flower bud formation but not to node formation.

464. VON ABRAMS, G. J.
Auxin relations of a dwarf pea.
Plant Physiol., 1953, 28: 443-56, bibl. 17.

The investigation has shown that intact dwarf and tall etiolated pea seedlings, variety Telephone, exhibit a differential response to applied IAA. Spray application of a 2 mg./l. IAA solution to plants six days of age resulted in a 30% increase in growth of the dwarf, as compared to the control, while growth of the tall variety was significantly repressed. Higher concentrations and more frequent applications did not increase the differential response. Efforts to relate this differential response to some particular aspect of the auxin metabolism were not successful. [From author's summary.]—Calif. Inst. Tech. Pasadena.

465. HYDE, T. G.
Nitrogen metabolism in *Pisum sativum*.
Biochem. J., 1953, 55 (2): xxi-xxii.

Green peas in pod were harvested at 16 different stages of development and the changes in nitrogen distribution, amino acids and peptides in both pods and seeds were studied. Findings are here discussed.

466. HEWITT, E. J., AND MILES, P.
The effects of seed reserves on the production of deficiencies of copper, zinc and molybdenum in some large-seeded leguminous crops.
A.R. Long Ashton agric. hort. Res. Stat. for 1952, 1953, pp. 199-203, bibl. 8, illus.

In sand culture trials with peas, dwarf and runner beans and broad beans the effect of seed reserves on the incidence of Cu, Zn and Mo deficiencies became reasonably clear. Deficiencies associated with reduced growth, reduced contents of Cu, Zn and Mo, and visual symptoms, which are described, resulted from the use of seed taken from plants grown in deficiency cultures. The significance of reductions in yield

associated with the use of seed saved from plants grown in complete nutrient compared with plants grown from commercial seed is, however, not understood; these reductions were not reflected in the nutrient status of the foliage.

467. APPLE, S. B., JR., AND BUTTS, J. S.

Soil temperature studies. 1. The effect of soil temperature and phosphorus on growth and phosphorus uptake by pole beans.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 325-32, bibl. 10, illus., being *Tech. Pap. Ore. agric. Exp. Stat.* 764.

Pole bean plants were grown under greenhouse conditions in a high-phosphorus soil at soil temperatures of 63° and 82° F. with and without soil applications of P. Differences in the percentage P content of the plants indicated that (a) the effect of soil-applied P in increasing the percentage P in the plants was significantly greater at the lower soil temperature than at the higher, and (b) the effect of soil temperature on the percentage P in the plants was significantly greater when no P was applied to the soil than when P was applied. The results are discussed and suggestions made with regard to their possible application. J.S.

468. KRAMER, A., AND AAMLID, K.

The shear-press, an instrument for measuring the quality of foods. III. Application to peas.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 417-23, bibl. 7, illus., being *Sci. Publ. Md agric. Exp. Stat. (Dep. Hort.)* A381.

Methods are described for measuring the tenderness and maturity of raw peas by means of the shear-press. It was found to be equal in precision and accuracy to the tenderometer and superior to the texturemeter. J.S.

469. QUANTZ, L.

Über das Verhalten von Buschbohnsensorten gegenüber den Bohnenmosaikviren 1 und 2. (The response of dwarf bean varieties to bean mosaic viruses 1 and 2.)

NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, **5**: 129-32, bibl. 4, illus.

Several years' field tests led to a classification of dwarf bean varieties according to their susceptibility to bean mosaic (*Phaseolus virus* 1). None of the varieties tested, including those resistant to virus 1, proved resistant to yellow bean mosaic (*Phaseolus virus* 2). Apart from modifications of varying intensity in growth habit and foliage, the varieties examined responded to inoculation with virus 2 either by wilting and necrosis or by mosaic markings on the leaves. Both groups of symptoms are illustrated.—Inst. f. Virusforsch., Celle.

470. ZAUMEYER, W. J., AND OTHERS.

Field control of halo blight of beans with streptomycin.

From abstr. in *Phytopathology*, 1953, **43**: 407.

The results of a trial in which beans [*Phaseolus*] were sprayed with a 0.1% aqueous solution of pure streptomycin sulphate plus a spreader to control halo blight (*Pseudomonas phaseolicola*) were: streptomycin 1 spray 19% infection, 2 sprays 12%, 3 sprays 3%, 4 sprays 1%,

compared with fermate (4 sprays) 18%, orthocide (4 sprays) 20%, and control 19%.

471. MUJICA R., F.

Razas fisiologicas y susceptibilidad varietal de los frejoles chilenos a la antracnosis. (Physiological strains and varietal susceptibility of Chilean french beans to bean anthracnose.) [English summary $\frac{1}{2}$ p.] *Agric. Téc. Chile*, 1952, **12**: 37-45, bibl. 10, illus.

The local french bean (*Phaseolus vulgaris*) varieties Arroz and Crystal and the introduced Red Kidney and Michelite are highly resistant or immune to the Chilean strain of *Colletotrichum lindemuthianum*, which causes bean anthracnose.

472. SPEYER, W.

2. Beitrag zur Bekämpfung des Erbsenwicklers (*Laspeyresia nigricana* Steph.). (2nd communication on the control of pea moth.)

NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, **5**: 171.

The results of spraying trials with DDT made it appear doubtful whether a really satisfactory control of the pea moth can be achieved with any of the insecticides available at present. Incidence of the pest on many dwarf, medium-high and tall pea varieties is tabulated. [For an abstract of the first communication see *H.A.*, 21: 3595.]—Biol. Bundesanst. Kiel-Kitzeberg.

473. PAGAN, C., AND MORRIS, M. P.

Derris deposits; fate of deposits on young bean plants.

J. agric. Food Chem., 1953, **1**: 580-1, bibl. 7.

This study showed that residues of latex emulsions, derris powders and water suspensions of derris powders lose their toxicity almost completely within 10 days. The loss in toxicity is due to decomposition or other chemical changes and not to absorption or translocation. J.S.

Mushrooms.

(See also 1031.)

474. CAIRNS, E. J.

Moisture conditions and control by heat of the mushroom-spawn nematode, *Ditylenchus* sp.

From abstr. in *Phytopathology*, 1953, **43**: 404-5.

Experiments indicated the limits in terms of time [not quoted in the abstract] and temperature (40-45° C.) necessary for killing the nematode under practical extremes of environmental moisture.

Onions and related crops.

(See also 400, 542h, p, u, 543i, k, 650.)

475. IWAMA, S., AND HAMASHIMA, N.

Ecological studies of vegetables at the regions of different altitudes. 5. Ecology behaviour of onion under varying daylength and temperature conditions. [Japanese, with English summary $\frac{1}{4}$ p.]

J. hort. Ass. Japan, 1953, **22**: 95-9, bibl. 12, illus.

Three onion varieties were planted at different seasons in 1950-52 to determine the effect on bulb formation of day length, temperature and age. The optimum temperature for autumn- and spring-sown onions was 18-20° C. In autumn-sown plants temperature was the limiting factor in development, bulb formation beginning when the mean daily temperature exceeded 10° C. in spring, i.e. long after day length became adequate. In spring-sown plants age was the controlling factor, bulb formation beginning much later than in autumn-sown plants, although day length and temperature were sufficient in the early stages of growth. Bulb formation began in the early, midseason and late varieties when the seedlings had 4, 5 and 6 leaves respectively.

476. YAKIWA, T.

On tillering in the genus *Allium*. 1. On the mechanism of the first tillering of Welsh onion. [Japanese.]
J. hort. Ass. Japan, 1953, **21**: 230-40, bibl. 5, illus.

Observations were made on the Welsh onion variety Sapporo-Futonegi. The first tiller is developed from the bud produced in the axil of the 6th or 7th leaf from the base of the stem. Leaves on tillers at first grow at right-angles to the leaves on the main stem, but the leaves on the main stem change direction later and become parallel to those on the tiller.

Y.A.

477. CHOUDHRI, R. S., AND BHATNAGAR, V. B.
Prevention of premature bolting in onions following maleic hydrazide treatment.

Proc. Indian Acad. Sci., Sect. B, 1953, **38**: 14-21, bibl. 20, illus.

Maleic hydrazide was applied by spray to the tops and in solution to the roots of Patna Red onions at Banaras at concentrations of 0.025, 0.10 and 0.25%. At harvest time the untreated controls showed about 40% bolting, whereas there was a progressive suppression of bolting following top spraying with increases in the concentration of maleic hydrazide. Results following root treatment were even more striking and practically no bolting occurred whatever the concentration. The conclusion is reached, after discussion, that maleic hydrazide at suitable concentration can be used advantageously to prevent bolting and to increase yield and quality of onion bulbs.

478. SEGALL, R. H.

Onion blast or leaf spotting caused by species of *Botrytis*.

From abstr. in *Phytopathology*, 1953, **43**: 483.

It has been found that onion leaf spotting and tip blighting, known in New York as blast and formerly believed to be physiogenic diseases, are caused by various species of *Botrytis*, including *B. allii*, *B. cinerea*, *B. tulipae* and *B. paeoniae*.

479. NEWHALL, A. G., AND OTHERS.

Liquid concentrates versus dusts for in-the-row treatments against seedling diseases and insect pests, with special reference to onion smut and maggot.

From abstr. in *Phytopathology*, 1953, **43**: 480-1.

New equipment designed to blow 10 to 30 lb. per acre

of a fungicide-insecticide-Pyrax dust into the furrow as seed is sown resulted in good control of onion smut and of maggot on 6 farms. Three fungicides and 4 chlorinated hydrocarbon and phosphoric ester insecticides were compared at 3 levels in different combinations. Seedling smut was reduced on 4 farms from 25, 25, 37, and 50% in the checks to 2, 1.2, 0.8 and 4.3% respectively. With other equipment, concentrated formaldehyde-liquid insecticide combinations, sprayed into the furrow, compared favourably with the regular drip and the dry pelleting methods of smut and maggot control. No fungicide-insecticide incompatibility was encountered.

480. ANON.

A promising onion harvester.

Fm Mech., 1953, **5**: 398, illus.

Notes are given on a new unit type of onion harvester, at present only in prototype form, claimed to reduce harvesting costs and damage to one-third of that of hand labour. It is estimated that in a crop of 8 to 10 tons to the acre, a machine could cover 6 acres a day. The unit principle of construction provides for one or more units to be used on a tractor toolbar to match the number of rows drilled. Each unit consists of an inverted dished plate, rotating beneath the onions, to lift and move them from the rows, with deflectors to put them into windrows.

481. ANON.

New system for the storage of onions.

Svenska Lantmannen, 1953, No. 29, from abstr. in *Minist. Agric. Fish. tech. Abstracts Scandinavia and Holland*, 1953, Edition 7, pp. 15-17.

One year's data are tabulated on storage losses of onions sprayed in the field with maleic hydrazide 1-3 weeks before harvesting. Sprouting was effectively controlled, the net gain after 172 days' storage being about 10% in the case of plants treated 2 or 3 weeks before harvest. The spray was applied at the rate of 61 gallons per acre at a concentration of 0.25%.

482. CIFERRI, R.

L'isopropilfenilcarbammato e il naftalenacetato di metile come antigermogliativi di patate e di cipolle. (Isopropyl phenyl carbamate and methyl naphthaleneacetate as sprout inhibitors of potato and onion.)

Humus, 1953, **9** (5): 12-14.

In experiments on the control of sprouting in storage of white onions (variety Maggiaiola) stored at 12-18° C., the growth regulators under test were applied as dusts in early December. In May the percentage weights of sprouts produced with a mixture of isopropyl-N-phenyl carbamate and methyl naphthaleneacetate in equal proportions at 100 mg./kg., with IPPC alone at 200 mg., and with MNA alone at 200 mg. were nil, 0.2 and 1.9 respectively.

483. JERMY, T.

A fokhagmapille (*Dyspessa ulula* Bkh.). (*Dyspessa ulula* as a pest of garlic.) [German summary.]

Ann. Inst. Prot. Plant, Budapest, 1950 (1952), **5**: 133, from abstr. in *PflSch. Ber. Wien*, 1953, **11**: 95.

In recent years *Dyspessa ulula* has become a serious

pest of garlic in southern Hungary. Its biology is discussed, but no control measures have yet been evolved.

Rhubarb.

484. MARNETTE, J.
La rhubarbe. (*Rhubarb.*)
Bull. hort., Liège, 1953, **8**: 260-1.

The following 3 varieties are mentioned as outstanding in this popular note on rhubarb cultivation: Paragon for earliness, well-developed petioles of good colour, and non-flowering; Vroege Spriet for earliness; and Victoria for well-developed petioles and reduced flowering.

Root crops.

(See also 543a, 650.)

485. WARNE, L. G. G.
Effects of close spacing on the growth of garden beet.
Nature, 1953, **172**: 506.

The effect of spacing on yield of garden beet and on the ratio of root weight to top is discussed. From several years' experiments it appears that, while in the absence of manuring close spacing may result in competition for nitrogen, and that competition for light may be operative, the major effects of close spacing on the growth of normally manured plants cannot be explained solely in terms of competition for water, light or the major nutrient elements.—Manchester Univ.

486. BERNSTEIN, L., AND AYERS, A. D.
Salt tolerance of five varieties of carrots.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 360-6, bibl. 6.

The effects of controlled levels of salinity on the yield, quality and chemical composition of 5 commercially important carrot varieties are described. Carrots are relatively sensitive to salinity, even when grown as a winter crop. The average yield was decreased 50% when the electrical conductivity of the saturation extract was 4.6 millimhos/cm. With increasing salinity, sucrose increased markedly in the roots, causing a pronounced improvement in flavour. Varietal differences in salt tolerance were not large, but a definite relationship between salt tolerance of the varieties and Ca/K ratio in the tops was observed. [Authors' summary.]—U.S. Salinity Lab., Riverside, Calif.

487. HARDENBURG, R. E., LIEBERMAN, M., AND SCHOMER, H. A.
Prepackaging carrots in different types of consumer bags.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 404-12, bibl. 5, illus.

After a 10-day transit period surrounded by ice, California-grown bunched carrots were topped and packed in 5 different types of transparent bag at Beltsville, Maryland, and stored at 70°, 40° and 32° F. in tests conducted in 1949 and 1952. The shelf-life of all the batches except one was about 6 days at 70° F., at least 2 weeks at 40° and 3 weeks at 32° F. Non-packaged bunched carrots were saleable for a much shorter period. Ventilation of the packages was found advisable, except of those made of Lumarith P912-100

(cellulose acetate). Perforated polyethylene 150 bags were especially suitable because of their strength and moisture-proof character. Pliofilm 75P6 bags were also very good in this respect, but as only sealed, non-perforated bags were tested, off-odours and off-flavours developed. J.S.

488. RADER, W. E.
Diseases of stored carrots in New York State.
Bull. Cornell agric. Exp. Stat. **889**, 1953, pp. 64, bibl. pp. 6½, illus.

The diseases of carrots commonly found in cold and ordinary storage in New York State are described and grouped according to their observed importance: *Rots of major importance*: Bacterial soft rot (*Erwinia carotovora*), satisfactorily checked by low temperatures; grey mould rot (*Botrytis cinerea*), occurring after an abundance of moisture before harvest; cottony soft rot (*Sclerotinia sclerotiorum* and other *Sclerotinia* spp.) can be kept to a minimum by proper crop rotation or by use of cyanamide in the field coupled with prompt cooling to 31° F.; crater rot (*Rhizoctonia carotae*) is not stopped by cold storage but is partly controlled by low humidity; liquorice rot (*Centrospora acerina*) at present confined to muckland crops grown in rotation with celery; black rot (*Stemphylium radicum*) is more prevalent in common than in cold storage, the control of this seed-borne fungus requiring crop rotation and foliage treatment with nabam or zineb. Five *rots of secondary importance* and many *rots of minor importance* are also discussed. Photographs, some of them coloured, and an identification key support the descriptions.

489. CORNS, W. G.
Improvement in frost resistance of parsnip tops sprayed with chemical growth substances.
Science, 1953, **118**: 281.

Parsnips sown in May 1952 were sprayed with various chemicals on 6 September of the same year. A month later the first frosts occurred with minimum night temperatures of 17-25° F. Observations on 7 October showed that the tops of all plants treated with 2,4,5-trichlorophenoxypropionic acid or with sodium naphthaleneacetate, at 1 lb. active substance in 50 gal. water per acre, were virtually uninjured by frost, while most of the leaves of the controls were collapsed and darkened. Prior to the first frost the spray caused perceptible, but not severe, brittleness in leaf stalks together with retardation of growth of the main root and an abundant development of fine lateral roots. The treatment apparently intensified a hardening off process in the parsnips.—Univ. of Alberta, Edmonton, Canada.

Salad crops.

(See also 37, 542b, 543h.)

490. ANON.
Résultats du forçage électrique des endives chez quelques professionnels. (*Commercial chicory forcing by electricity.*)
Rev. hort. Paris, 1953, **125**: 933.

Notes are given on costs and current consumption. Trench heating costs were just under 5 fr. per kg. of chicory harvested. Electricity consumption in permanent installations was 0.5 kwh. per kg. and in the case

of portable heating frames 0.6-1.046 kwh. per kg. of chicory harvested.

491. HOWARD, H. W., AND LYON, A. G.
Biological flora of the British Isles. *Nasturtium officinale* R. Br.
J. Ecol., 1952, **40**: 228-38, illus., from
 abstr. in *Rev. appl. Mycol.*, 1953, **20**: 352.

This comprehensive study of watercress (*Nasturtium officinale*), *N. microphyllum*, and the hybrid brown watercress includes a section (pp. 237-8) on plant parasites which attack these species. Although *Pythium* spp. are reported to be associated with stem and root rots, recent unpublished work by D. M. Spencer suggests that these and other fungi only attack plants already weakened by *Spongospora*. Other parasites include *Peronospora parasitica* and *Cystopus candidus*, which attacks only young plants.

Spinach.

492. KRAUSE, W. G. C.
Better chance for spinach.
Comm. Grower, 1953, No. 3015, p. 702,
 illus.

The new Cavallius variety of spinach has given excellent results on the continent. It is early, has a short growing season, and produces high yields. It also makes such rapid growth that the problem of weed control is largely overcome. Recommendations are made for producing autumn, winter and spring crops under glass.

493. HO[UTER, P. J.]
 De invloed van roedenmateriaal op de opbrengst van spinazie en tomaten in een onverwarmde kas. (The effect of sash bar material on the yield of spinach and tomatoes in a cold house.)
Jaarversl. Inst. TuinbTech. Wageningen 1952, p. 18.

Spinach gave higher yields in a house with wooden sash bars than in a house with concrete or iron sash bars, while the lowest yields were obtained in a Dutch light house. As in the previous year [see *H.A.*, 23: 797] the south borders were more productive than the north in iron and concrete houses. Tomatoes again yielded best in a wooden house but the quality was less good than in the other types of house. This is attributed to the higher temperatures.

Tomatoes, eggplants and capsicums.

(See also 2, 9, 20, 26, 39, 40, 41, 64, 77, 164, 308, 493, 542a, f, g, i, p, t, w, x, y, 543e, f, f, m, n, 768, 1037, 1038, 1059.)

494. CHESHUNT.
Tomatoes.
A.R. Cheshunt exp. Res. Stat. 1952, 1953,
 pp. 14-20.

(1) In a glasshouse using the variety E.S.1 4 plots were planted at a density of 16,000 plants per acre, which is the standard practice, and 4 plots were planted at a density of 8,000 plants per acre. The total crop yield was practically the same from the 2 densities, indicating that the plants receiving twice the amount of space produced twice the weight of crop per plant. The early yield, however, was larger at normal spacing. (2) Defi-

ciency experiments have shown once again that unmanured and potash deficient plots give the highest proportion of blotchy fruit. (3) Neither yield nor quality of fruit were affected when the soil pH was reduced by sulphur treatment. (4) Both steam sterilization and DD injection proved effective against the tomato root knot eelworm, though the yields were higher in the steam sterilized plots. (5) Yields from steam sterilization and chloropicrin were higher than the controls, but formaldehyde treatments were ineffective. (6) Omission of either lime or phosphates did not affect yields but there was some yield reduction where both of them were withheld. (7) In the variety trials Aldourie gave the highest yield.

495. JURIN, V. P.
Grafting *Solanum dulcamara* on the tomato Budennovka. [Russian.]
Agrobiologija, 1951, No. 1, pp. 175-7.

The characteristics of the graft and its seedling progeny are described. Some of the seedlings produced earlier and heavier crops than the original tomato variety and show promise for breeding.

496. BULLARD, E. T., AND STEVENSON, E. C.
Production of hybrid tomato seed.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 451-8,
 bibl. 13, being *J. Pap. Purdue agric. Exp. Stat.* 649.

Experiments were conducted to find economical methods of producing hybrid tomato seed. Blowflies, house flies and honey bees would not pollinate tomatoes under the controlled conditions used. The use of positional-sterile plants reduced pollinating time 46%. The most economical method of cross-pollination was found to be to hand-pollinate sterile plants. Under the conditions of the experiment in 1949, it was found that it was not economical to use stored pollen for pollination. 6 lb. of hybrid seed per acre were obtained by using alternating rows of Pritchard-sterile and fertile plants. A discussion of hybrid seed production is given. [Authors' summary.]

497. LEARNER, E. N., AND WITTWER, S. H.
Some effects of photoperiodicity and thermo-periodicity on vegetative growth, flowering and fruiting of the tomato.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 373-80,
 bibl. 10, being *J. Art. Mich. agric. Exp. Stat.* 1430.

Details are given of yield increases, forwarding of development and improved fruit quality in tomato plants grown in midwinter when the day length was extended to 16 hrs by using 300 foot-candles of white fluorescent light. There were differences in varietal response when night temperatures were raised to 50°-60° F. Increases in day length to 16 hrs and of night temperatures to 80° F. for 10 days and then 70° F. until transplanting resulted in earlier, heavier and better quality fruit of the Michigan State Forcing variety than was produced by plants grown continuously at 60° F. with normal light. J.S.

498. FRITSCH, —.
Bestrahlungsversuche. (Illumination experiments.)
Tech. Bauern Gärt. Ausg. G., 1953, **5**:
 387-8, illus.

In small-scale trials supplementary illumination in autumn and winter with mercury and other types of light to provide a longer light period proved beneficial to the growth of young tomatoes, *Begonia semperflorens*, stock, cyclamen and *Primula obconica*, while the treatment had no effect on hydrangea. The experiments with tomatoes are more fully discussed than the others.—Gartenbau-Versuchsanst. Fünfhausen, Hamburg.

499. REINDERS-GOUWENTAK, C. A.
Stoottomaten en kunstlicht. (Glasshouse tomatoes and artificial light.)
Reprinted from *Groenten en Fruit*, 24 Dec. 1952, No. 23, bibl. 2, illus.

Tomato plants raised during winter and given artificial light before they were planted out, from 8 a.m. till 3-4 p.m. to increase the light intensity during the day, yielded twice as heavily as untreated plants during the first month of harvest [see *H.A.*, 22: 1594]. The following year trials were carried out to compare this method of supplementary lighting with the method recommended by the John Innes Institution of giving artificial light during the night [see *H.A.*, 22: 602]. With the English method the best results were obtained when illumination was given from 6 to 9 a.m. Illumination during the day, however, gave better results than illumination at any time during the night. [No figures are given].—Lab. algem. Plantkunde, Wageningen.

500. HO[UTER, P. J.], AND DE JO[NG, L.].
Invloed van het verwarmingssysteem op de ontwikkeling van tomaten en snijbonen in kassen. (The effect of the heating system on the development of tomatoes and french beans under glass.)
Jaarversl. Inst. TuinbTech. Wageningen 1952, pp. 25-7.

A winter and summer crop of tomatoes and an autumn crop of french beans were grown with 4 systems of glasshouse heating: (1) air warming, (2) warm water with natural circulation, (3) low-pressure steam, and (4) thin pipes. The tomatoes in both cases gave the highest yields, largest percentage of top grade fruit and lowest amount of botrytis infection in the air-warmed house. This indicates that tomatoes benefit from good air circulation. The lowest total yields were obtained from low-pressure steam in winter and from warm water in summer. With beans, however, air warming gave the lowest yields and warm water the highest. With both crops botrytis infection was most severe with low-pressure steam, as a result of the sudden change from night to day temperatures.

501. VINOGRADOV, P. I.
Hastening the fruiting of tomatoes in Moldavia. [Russian.]
Agrobiologija, 1951, No. 3, pp. 52-61, bibl. 5, illus.

In Moldavia tomatoes are usually sown in frames in March and planted out in May after the danger of late frosts has passed; the first fruits are picked in early July. A new method, tried since 1945, has shown, however, that both earliness and yield can be improved by considerably earlier sowing and somewhat earlier planting out. The temperature of the frames in which the seed was sown at the end of January-early February

was maintained at 15-18° C. until germination was completed, was then reduced to 7° C. for 2 weeks to retard growth and finally was increased to 15° C. for the rest of the growing period. The seedlings were planted out in April, i.e. remained in the frames for 70-80 days, instead of the usual 45-55 days. The hardened plants withstood a few degrees of frost, though inevitable losses did occur, and flowered and fruited about a month earlier than those raised by the conventional method. A varietal difference in the response of plants to this treatment was observed, but on the whole the older the seedlings were on planting out, the earlier they entered into maximum fruit production.

502. UNGER, K., AND FABIG, F.
Über den Einfluss der Temperatur auf die Erntezeit und Ertragssicherheit bei einigen Tomatensorten. (On the influence of temperature on time of harvest and cropping in some tomato varieties.)
Züchter, 1953, 23: 257-66, bibl. 5.

The Quedlinburg departments of agricultural meteorology and of plant breeding of the Deutsche Akademie der Landwirtschaftswissenschaften, Berlin, are concerned in the selection of outdoor tomato varieties for good cropping in a relatively cool season. Five years' experiments with 4 varieties, including Quedlinburger Frühe Liebe, showed clearly that the temperature requirements of tomato varieties can be determined in field trials. Optimum and threshold values of day and night temperatures are tabulated for the 4 varieties tested, the optimum day temperature for Frühe Liebe being 14.0° C. from planting to flowering and 17.5° C. from flowering to harvest.

503. HO[UTER, P. J.]
Toepassing van geperforeerde dubbele potten voor tomatenteelt onder glas. (The use of perforated double pots for tomatoes under glass.)
Jaarversl. Inst. TuinbTech. Wageningen 1952, pp. 23-4.

Double, perforated plastic pots were compared with normal clay pots for tomatoes under glass. In a heated glasshouse root development and yields were better in the clay pots, while in a cold house there was little difference. Growers have found that better results are obtained on wet peat soil. There appeared to be too much light between the walls of the inner and outer pots.

504. SIEV, D.
Sugar solution sprays to help establishment of young tomato plants. [Hebrew.]
Hassadeh, 1953, 33: 590-1, bibl. 2.

Two experiments are described in which sugar solution sprays were applied to tomato plants while still in the nursery. Four treatments were given: (a) daily spray for 3 consecutive days before planting out, (b) control (no spray), (c) as (a) but with an additional spray after planting out, (d) one spray only after planting out in the field. The amount of sugar used was 1-1½ kg. for three sprayings of 1,000 plants. Spraying increased significantly the percentage of plants established after planting out, treatment (c) giving the greatest increase.
H.C.R.

505. VITTMUM, M. T., AND TAPLEY, W. T.
Spacing and fertility level studies with a determinate-type tomato.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 339-42,
bibl. 2, being *J. Pap. N.Y. St. agric. Exp. Stat.* 904.

Results from four years of field experiments comparing three spacings of determinate-type Gem tomatoes at each of two fertility levels indicate that close spacing (10 square feet per plant) considerably increases the acre yield, slightly reduces the number of fruits harvested per plant and slightly reduces the average weight per fruit. High fertility level increases the number of fruits per plant and the acre yield but decreases the average weight per fruit. Largest acre yields resulted from a combination of close spacing and high fertility level. [From authors' summary.]

506. LEGGIERI, L.
Influenza della precessione colturale e dell'epoca di trapianto sulla produttività e sulla durata del ciclo vegetativo del pomodoro così detto S. Marzano. (The effect of crop rotation and date of transplanting on the yield and length of the growing cycle of the S. Marzano tomato.)
Ann. Fac. Agrar. Portici, 1950/1951 [issued 1952], **19**: 24-31.

In trials near Salerno in 1949 the yields of tomatoes from 3 dates of planting were normal (688 quintals per ha.)—early (655)—late (235) on land not previously under tomatoes; early (407)—normal (406)—late (317) after grain; and normal (222)—early (212)—late (189) after tomato. The order of length of harvest was: early (53 days)—normal (47)—late (36) on new land; early (31)—normal (31)—late (18) after grain; and normal (21)—early (18)—late (14) after tomato. Plants grown on new land on a long rotation showed the best resistance to tracheomycosis and bacteriosis.

507. SALTER, P. J.
Water control in tomatoes under glass. Soil moisture planned to suit crops.
Grower, 1953, **40**: 829-31, illus., and 881-3.

These 2 papers report experiments carried out in 1952 and 1953 respectively at Sutton Bonington to investigate the relationship between soil moisture and the rate of growth and yield of glasshouse tomatoes. In the first year water was applied to field capacity when the moisture tension at a depth of 6 in. reached 7, 15, 30 and 60 cm. Hg respectively. The best vegetative growth, yields and fruit quality were obtained when the moisture tension was not allowed to exceed 7 cm. Hg (the treatment requiring the greatest amount of water). The zone of greatest root development was deeper in the drier treatments [see also *H.A.*, 23: 1947 and 3162]. In the second year an additional comparison was made of the value of trickle irrigation and watering with a watering can for maintaining the low tension of 7 cm. Hg. Highest yields were again obtained from soils with the lowest moisture tension but there was no significant difference in yield between trickle irrigation and normal watering, although growth was more vigorous, the fruit larger, and soil structure better under trickle irrigation. In this year, contrary to the previous year, the total amount of water applied during the season was lowest in the treatments maintaining the lowest moisture

tension, showing that the quantity of water applied to a crop over a season is less important than the maintenance of a constant water regime.

508. MCGREGOR, S. M., AND STREET, H. E.
The carbohydrate nutrition of tomato roots. IV. The nature and distribution of acid phosphatases.
Ann. Bot. Lond., 1953, **17**: 385-94, bibl. 24, illus.

From a study of the distribution of acid phosphatase activity in tomato roots, evidence has been obtained for the presence of two orthophosphatases and of a pyrophosphatase. The results are discussed in the light of the possible roles of these enzymes in carbohydrate metabolism. J.S.

509. NETTLES, V. F., AND HAMDI, S.
Influence of soil fumigants on total nitrogen, potassium, magnesium and calcium content of tomato leaves.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 343-5, bibl. 4, being *J. Ser. Fla agric. Exp. Stat.* 90.

Soil fumigation with dichloropropane-dichloropropene mixture or ethylene dibromide influenced the mineral composition of young upper leaves of tomato plants when 4 and 8 weeks old. The per cent. total nitrogen of the leaves was increased by the use of D-D. An increase in potassium in young plants on fumigated soil was found; in older plants, an increase in magnesium content was found. Calcium content was not significantly influenced by soil fumigation. [From authors' summary.]

510. CAWTHRON INSTITUTE.
Effect of additional potash and nitrogen applications on quality of tomatoes.
A.R. Cawthron Inst. 1952/53, p. 24.

Nitrogen, potassium or nitrogen plus potassium fertilizers added to the standard tomato fertilizer resulted in a great improvement in fruit quality. The best tomatoes were produced by plots receiving additional nitrogen plus potash.

511. LEOPOLD, A. C., AND GUERNSEY, F. S.
The effect of nitrogen upon fruit abnormalities in the tomato.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 333-8, bibl. 13, being *J. Pap. Purdue agric. Exp. Stat.* 654.

Four nitrogen levels and 3 setting procedures (30 p.p.m. parachlorophenoxyacetic acid (PCA) sprayed on the face of the flower, PCA sprayed on the back of the flower, and tapping to ensure natural pollination) were applied to Michigan State Forcing tomatoes, under greenhouse conditions. The incidence and severity of puffiness of the fruit were associated with nitrogen supply. PCA did not increase puffiness when sprayed on the front of the flower except when the nitrogen level was excessive (400 p.p.m.). PCA sprayed on the back of the flower was associated with more puffiness than occurred with natural pollination at every nitrogen level. Blossom-end rot, green locules and white placentas were all most common at the high nitrogen levels. Green locules and white placentas were almost entirely restricted to fruit set with PCA, but blossom-end rot was not increased by PCA. J.S.

512. SELL, H. M., AND OTHERS.
Comparative stimulation of parthenocarp in the tomato by various indole compounds.
Plant Physiol., 1953, **28**: 481-7, bibl. 33, being *J. Art. Mich. agric. Exp. Stat.* **1385**.
 In the tomato parthenocarp fruit test, 10 derivatives of indole-3-acetic acid were found to have greater fruit-setting activity than the parent compound. Esterification of the carboxyl group of indole-3-acetic acid with a methyl or ethyl radical increased the activity 100-fold. The activity of the esters decreased as the size of the alkyl radical was increased. Mono-substitution of the hydrogen by chlorine in any of the positions in the benzene ring of indole-3-acetic acid increased the activity 10-fold. In contrast to indole-3-acetic acid, esterification of the chloroindole-3-acetic acids did not increase the fruit-setting activity. The 1-benzoylindole-3-acetic and 2-methylindole-3-acetic acids were only one-tenth as effective as the parent compound. [From authors' summary.]
513. HERRMANN, —.
Wuchshormone im Tomatenanbau. (The use of growth substances in tomato culture.)
Gartenwelt, 1953, **53**: 233-4, 258-9, illus.
 In glasshouse trials with 4 tomato varieties hormone application (4 commercial products) to the flowers increased earliness, improved quality and raised gross returns by 23.7% at a cost of about DM. 3 for the treatment of 100 plants. Field trials with outdoor tomatoes were inconclusive. Full data are tabulated.—Bonn Univ.
514. RAMSEY, G. B., WIAIT, J. S., AND MCCOLLOCH, L. P.
Market diseases of tomatoes, peppers and eggplants.
Agric. Handb. U.S. Dep. Agric. **28**, 1952, pp. 54+15, plates, bibl. 107, 40 cents.
 This is an extensive revision of and supersedes *Misc. Publ.* 121 published in 1932 [see *H.A.*, 3: 185]. In it the symptoms are described and control measures suggested for 42 disorders of tomato, 14 of sweet pepper and 7 of eggplant.
515. CAWTHRON INSTITUTE.
"Hard core" investigations.
A.R. Cawthron Inst. 1952/53, p. 25.
 In a trial to determine the susceptibility of 5 tomato varieties to hard core, Kondine and Exhibition were found particularly prone to the disorder, and Invincible very resistant.
516. GOVINDAN, P. R.
Induced toxicity and deficiency symptoms of zinc in tomato.
Sci. and Cult., 1953, **19**: 46-7, bibl. 8.
 Tomato plants were grown in sand culture to which zinc sulphate at concentrations of 0, 0.5, 1.0, 2.0 and 3.0 p.p.m. was added. Symptoms of zinc deficiency and toxicity are described. The latter appeared at concentrations of 2.0 and 3.0 p.p.m.—*Coll. Agric.*, Banaras Hindu Univ.
517. EVANS, H. J., AND TROXLER, R. V.
Relation of calcium nutrition to the incidence of blossom-end rot in tomatoes.
Proc. Amer. Soc. hort. Sci., 1953, **61**: 346-52, bibl. 15, being *Pap. Dep. Agron., N.C. agric. Exp. Stat.* **454**.
 In field experiments the application of 1,000 lb. of CaO in the forms of phosphate gypsum and calcium nitrate, and 2 sprays with CaCl₂ solution, significantly reduced the incidence of blossom-end rot and significantly increased the calcium content of normal fruit. In greenhouse experiments plants sprayed with CaCl₂ solution developed significantly fewer blossom-end rot fruit than comparable plants sprayed with water. Injection of fruits with sterile calcium gluconate solution completely prevented the disease in greenhouse experiments and reduced the incidence of the disease from 29 to 2% in the field. The disease is discussed from the standpoint of the influence of organic acids on calcium assimilation. [From authors' summary.]
518. BRIERLEY, P., SMITH, F. F., AND DOOLITTLE, S. P.
Experiments with tomato aspermy virus from chrysanthemum.
 From abstr. in *Phytopathology*, 1953, **43**: 404.
 Tomato aspermy virus infected 34 out of 73 species tested. Notes are given on its effect on some of the test plants and on transmission by aphids.
519. KENDRICK, J. B., JR., TROXEL, A. W., AND HARDING, R. B.
TMV concentration in Marglobe tomatoes as affected by nitrogen availability.
 From abstr. in *Phytopathology*, 1953, **43**: 477.
 TMV [tomato mosaic virus] concentration measured as mg. of virus protein per gram of fresh leaf tissue averaged 34% less in N-deficient plants and 50% more in N-excess plants than that in plants with adequate nitrogen. Between 370 and 400 mg. virus protein was produced for each gram of total leaf nitrogen. This seems to indicate a direct relationship between nitrogen availability and virus elaboration rather than a direct relationship between plant growth and virus production.
520. GROGAN, R. G., AND KENDRICK, J. B. S.
Seed transmission, mode of overwintering and spread of bacterial canker of tomato caused by *Corynebacterium michiganense*.
 From abstr. in *Phytopathology*, 1953, **43**: 473.
 In Californian studies seed transmission of tomato bacterial canker was never more than 1%. Field carry-over from one season to another is unimportant. The disease will, however, survive from one season to the next in diseased plant material incorporated into plant bed soil. The plant bed-to-field transplant method often results in more than 50% diseased plants, whereas direct field seeding has never shown more than a trace of canker. In California effective control of bacterial canker can be secured by direct field seeding.
521. LINK, G. K. K., AND OTHERS.
Role of nitrate-nitrogen nutrition in growth of tomato and crown gall.
Amer. J. Bot., 1953, **40**: 436-44, bibl. 15, illus.
 Rooted cuttings of tomato plants, grown at different levels of nitrate-nitrogen nutrition, were inoculated with crown-gall bacteria. Failure to respond with tumour formation occurred only when inoculations were made in the basal and middle internodes of the

oldest —N cuttings. Upper tumours in both +N and —N stems were larger than those on more basal internodes. Tumours in comparable inoculation sites were almost as large in —N as in +N plants in spite of marked differences in the size of the plants. Inoculation of the hypocotyls of seedlings showed that tumours have little effect on development and survival of +N plants unless they severely disrupt the internal structure of the axis. Tumours on —N plants, however, depress the rate of axis elongation, reduce leaf formation and leaf survival and lead to death of the growing point. It appears that dominance for growth potential and mobilization of nutrients passes from the apical growing point to the tumour. In cases of severe injury tumours in —N plants may attain such an ascendancy over the growing points that the apex dies while the tumour persists. Given a suitable concentration of nutrients, tumours apparently grow at characteristic rates only slightly affected by the nutrition, vigour or growth behaviour of the host.—Univ. Chicago, Illinois.

522. WILLIAMS, P. H., SHEARD, E., AND READ, W. H.

Didymella stem rot of the tomato.

J. hort. Sci., 1953, **28**: 278-94, bibl. 21, illus.

Symptoms of the attacks by *Didymella lycopersici* are described, those on stems and fruits being the most common. It is thought that among alternate host plants only *Solanum nigrum* may be important. Growth of the fungus is favoured by the incorporation of stable manures and straw and by low temperatures and high water content. It is greatly curtailed by temperatures of 27° C. and over. It affects steam sterilized soil more readily than unsterilized. Air-borne spores are the most important source of reinfection. Trials gave no indication that varying the N, K or P content of the soil affects susceptibility. Control measures are discussed and a method of treating the soil with ethyl mercury phosphate is described.

523. HACK, J., AND WILLIAMS, P. H.

Didymella stem rot.

A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 21-3, bibl. 1.

Investigations on *Didymella lycopersici*, including inoculation and wound penetration studies.

524. BLOOM, J. R.

Effect of nutritive foliage sprays on physiology and development of *Fusarium* wilt of tomato.

Abstr. in *Phytopathology*, 1953, **43**: 466-7, 466-7.

Bonny Best tomato plants growing in Hoagland's balanced solution in quartz sand continuous drip culture were given supplementary nutrient by spraying the foliage with various concentrations of urea, sodium glycerophosphate, potassium formate, KCl, MgSO₄, CaCl₂, (NH₄)₂SO₄, Na₂SO₄, NaH₂PO₄, NaCl, Ca(NO₃)₂ and MgCl₂ before and after inoculation with *Fusarium oxysporum* f. *lycopersici* (Sacc.) (S. & H.). Sucrose was used alone and was added to each other spray to prevent foliage burning. All the materials caused increase in disease with increased nutrient concentrations when applied after inoculation, except potassium formate and MgSO₄ which decreased disease with increased

concentrations. Some nutrients gave opposite results when applied before, as compared with after, inoculation. High concentrations of potassium on foliage increased disease while high potassium supplied through roots decreased disease. Transpiration was decreased by nutrients which increased disease and was increased by MgSO₄ and potassium formate which decreased disease. No correlation has been found between respiration and disease as influenced by nutrition. High potassium on foliage apparently retarded the action of amylase in the conversion of starch to sugar. Stem tissue contained higher percentages of potassium than leaf tissue, while leaf contained the higher percentages of magnesium.

525. GOTHOSKAR, S. S., AND OTHERS.

The role of pectic enzymes in *Fusarium* wilt of tomato.

Phytopathology, 1953, **43**: 535-6.

Pectin methyl esterase, the major constituent of the extracellular pectin enzymes produced in significant quantity by *Fusarium oxysporum* f. *lycopersici*, is the most important single factor in causing the wilt and vascular discoloration characteristic of infected tomato plants.

526. SCRIVANI, P.

Ricerche su di una specie di fusarium (*Fusarium solani* [Mart] App. et Wr.), produttore una tracheomicosi del peperone (*Capsicum annuum*). (Studies on a *Fusarium* sp. causing wilt in pepper.) [English summary 5 lines.]

Phytopath. Z., 1953, **21**: 97-103, bibl. 7, illus.

A fungus isolated from pepper plants affected with wilt was identified as *Fusarium solani* var. *martii*. Although this strain does not produce lycomarasmin, its culture filtrates proved toxic to cut tomato and pepper shoots at concentrations as low as 1:16.—Milan Univ.

527. ORILLO, F. T., AND BOMBAY, B. B.

Melanconium fruit rot of tomato.

Philipp. Agric., 1952, **36**: 114-30, bibl. 6, illus.

A description is given of melanconium fruit rot (*M. lycopersici*) which affects tomato fruits in the field, in transit and in storage, and also the stems, leaves and flowers. Big and Small Susong Kalabaw were the most resistant of 4 varieties subjected to inoculation trials. Control measures are sanitation, crop rotation, selection and disinfection of seeds, and careful handling of fruit.

528. EBBEN, M. H., AND WILLIAMS, P. H.

Tomato root rot.

A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 23-5.

Fungi found in tomato root rot investigations included *Penicillium* spp., *Mucor* spp., *Fusarium* spp., and *Colletotrichum atramentarium*.

529. TUFT, T. O., AND ANDERSON, L. D.

Acaricides for control of tomato russet mite in California.

J. econ. Ent., 1953, **46**: 502-4, bibl. 6.

In laboratory trials 28 materials, applied as dusts, were

tested for effectiveness in controlling the tomato russet mite, *Vasates destructor*. Parathion, metacide, compound R-242, toxaphene, *p*-chlorophenyl *p*-chlorobenzene sulphonate (K-6451) and endrin appeared to be as effective as sulphur, which is the recommended material.

530. READ, W. H., SMITH, R. J., AND^{*} HUGHES, J. T.

Systemic insecticides for red spider control.
A.R. Cheshunt exp. Res. Stat. 1952, 1953, pp. 52-3.

Results of trials, here outlined, indicate that the prevention of infestation of tomato plants by red spider mites [*Tetranychus telarius*] by destruction of overwintering adult females which gain access to the plants is unlikely to be achieved by the application of systemic insecticides to the soil in the pots from which they are planted out.

531. GRIFFING, B.

An analysis of tomato yield components in terms of genotypic and environmental effects.
Res. Bull. Ia agric. Exp. Stat. 397, 1953, pp. 324-80, bibl. 12.

A detailed statistical analysis of tomato yield is made by partitioning yield into component parts. The study consists of 3 parts: (1) an analysis of the variables yield, number of fruits and fruit weight, (2) an analysis of the variables, number of fruit and its components, number of clusters and number of fruits per cluster, and (3) a biological interpretation of the relationships found to exist in the above analyses.

532. SAYRE, C. B., ROBINSON, W. B., AND WISHNETSKY, T.

Effect of temperature on the color, lycopene and carotene content of detached and vine-ripened tomatoes.

Proc. Amer. Soc. hort. Sci., 1953, 61: 381-7, bibl. 10, being *J. Pap. N.Y. St. agric. Exp. Stat.* 906.

Tomatoes ripened either on the plant or detached at a temperature range of 60° F. day and 45° F. night became fully ripe in 12-15 days from the "turning" stage, according to variety; and at 80° F. day and 65° F. night, in 9 days. At 100° F. day and 85° F. night, development of lycopene was inhibited. Carotene content was not greatly affected by these temperature ranges. There was no significant difference in colour or composition between tomatoes ripened on the vine or detached.

J.S.

533. SOUTHWICK, F. W., AND LACHMAN, W. H.
The effect of maleic hydrazide and water on the rate of respiration of harvested tomato fruits.

Proc. Amer. Soc. hort. Sci., 1953, 61: 388-94, bibl. 6, being *Contr. Mass. agric. Exp. Stat.* 865.

Maleic hydrazide had a slight inhibitory effect on the rate of respiration of harvested preclimacteric tomatoes, delaying ripening by a day or two compared with the controls. The absorption of water by such tomatoes tends to hasten their rate of respiration and colour change.

J.S.

534. MCCOLLUM, J. P.

A rapid method for determining total carotenoids and carotene in tomatoes.

Proc. Amer. Soc. hort. Sci., 1953, 61: 431-3, bibl. 3.

A method is described for determining total carotenoids and carotene in red and yellow tomatoes. The method is sufficiently accurate for measuring small differences and can be adapted for analyzing a large number of samples. The solvent requirement per sample is low. By determining both total carotenoids and carotene the method may be used to indicate the color of tomato products and vitamin A activity. [Author's summary.]

535. COLES, J. V.

Fresh tomatoes at retail.

Calif. Agric., 1953, 7 (9): 15-16.

A comparison of 255 packages and 449 bulk samples of tomatoes bought in retail stores in Berkeley, Calif., showed little difference in average quality. Defects are analysed and prices at different seasons compared.

536. ANON.

Tomaten-Reinigungs- und Sortiermaschine. (A machine for the cleaning and grading of tomatoes.)

Tech. Bauern Gärtner. Ausg. G., 1953, 5: 442, illus.

Mechanical brushes remove the spray residue from tomato fruits before they are graded. The machine is illustrated.

537. HEISER, C. B., Jr., AND SMITH, P. G.

The cultivated capsicum peppers.

Econ. Bot., 1953, 7: 214-27, bibl. 38, illus.

The uses and taxonomy of the 4 cultivated species now recognized, viz. *Capsicum pubescens*, *C. pendulum*, *C. frutescens*, and *C. annuum*, are discussed.

538. DEMPSEY, A. H., AND BRANTLEY, B. B.

Pimiento production in Georgia.

Bull. Ga Exp. Stat. 277, 1953, bibl. 12, illus.

Georgia farmers grow approximately 75% of the pimiento produced in the United States, the majority of which is processed. The culture of the crops from raising the seedlings, by 3 different methods, to harvesting is described. Diseases, more than any other single factor, are responsible for the low average yields obtained. Recommendations are made for the control of the more important, which include damping-off, blue mould, cercospora leaf spot, bacterial spot, mosaic, southern blight, blossom-end rot, anthracnose and ripe rot. Pests are also listed and methods for their control are discussed.

539. PETROSINI, G.

Sui rapporti fra vitamina C e pigmentazione carotinoidea. Ricerche sui peperoni—Nota IV. (On the relationship between vitamin C and carotenoid pigmentation. Studies on peppers. Note 4.)

Ann. Fac. Agrar. Portici 1950/51, 1952, 19: 55-60, bibl. 12.

In the four common southern Italian varieties of pepper (*Capsicum annuum*) studied, the vitamin C content of the fruit increased with maturity.

540. FRANSSEN, C. J. H., NIJVELDT, W., AND MO, T. T.
Een voor Spaanse peper schadelijke galmug. (A gall midge injurious to Spanish peppers.) [English summary 4 lines.]
Tijdschr. PlZiekt., 1953, **59**: 178-80, bibl. 6, illus.

The gall midge *Asphondylia capsici*, which causes serious injury to sweet peppers in Java, is described. Fruits attacked at an early stage of development remain small and round. Those attacked later become characteristically twisted.

541. HARE, W. W.
Nematode resistance in pepper.
From abstr. in *Phytopathology*, 1953, **43**: 474.

The resistance of susceptible, intermediate and resistant capsicum varieties to the following nematodes was tested: *Meloidogyne incognita*, *M. incognita* var. *ascrita*, *M. arenaria*, *M. javanica* and *M. hapla*.

Noted.

542.
a AIRAN, J. W., AND BARNABAS, J.
Estimation of amino acids in tomato fruit by circular paper chromatography.
Sci. and Cult., 1953, **19**: 201-2, bibl. 2, illus.
b BOHN, G. W., FOSTER, R. E., AND WHITAKER, T. W.
Lettuce mosaic in the Imperial and Yuma Valleys.
Plant Dis. Repr., 1953, **37**: 134, bibl. 2.
c BURKE, O. D., AND KIRBY, R. S.
Prevent vegetable diseases.
Circ. Pa agric. Ext. Serv. **417**, 1953, pp. 30, illus.
Symptoms and control measures.
d CAREW, J., CHUPP, C., AND LEIBY, R. W.
Muskmelons and watermelons.
Cornell Ext. Bull. **878**, 1953, pp. 11.
Cultivation hints.
e CONNELL, W. A., MACCREARY, D., AND MILLIRON, H. E.
Comparison of organic insecticides on broccoli.
Trans. Peninsula hort. Soc., 1952, **42** (5): 24-7.
f DAVIES, J. N., AND OWEN, O.
Soil sterilization. II. Ammonia and nitrate production in a glasshouse soil steam-sterilized *in situ*.
J. Sci. Food Agric., 1953, **4**: 248-56, bibl. 10.
Using an old tomato soil. [For Part I see *H.A.*, 21: 3580.]
g DERMOTT, W.
The manuring of glasshouse tomatoes.
Agriculture, Lond., 1953, **60**: 362-7.
Experience in south-eastern England.

- h DOROSZEWSKI, M.
Z badań nad działaniem fitoncydów cebuli na *Paramecium caudatum* Ehrb. (The effect of onion phytoncides on *P. caudatum*.) [Summaries in Russian and English ½ p.]
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Züchter, 1953, **23**: 223-43, bibl. 46, illus.
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Curr. Sci., 1953, **22**: 208-9, bibl. 11.
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Ann. Épiphyt., 1953, **4**: 23-43, bibl. 35, illus.
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New Phytol., 1953, **52**: 210-17, bibl. 22, illus.
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Analyse van het tijdgebruik bij het tomaten plukken. (*Time study of tomato picking.*)
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Wettable powder versus tank-mix dithiocarbamates on potatoes and tomatoes in Ohio.
Res. Circ. Ohio agric. Exp. Stat. 9, 1953, pp. 22, bibl. 19.
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Leaf-mining pests in New Zealand.
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Various drying methods and the role of respiration in determining apparent dry matter content of summer squash.
Proc. Amer. Soc. hort. Sci., 1953, 61: 424-30, bibl. 9.

TOBACCO.

General.

(See also 1, 17, 36, 41, 164, 401, 402, 833, 1037-1039, 1045, 1047, 1053, 1057.)

544. CAWTHRON INSTITUTE.

Tobacco research.

A.R. Cawthron Inst. 1952/53, pp. 29-34.

Diseases: Mosaic: In testing the effect of different cover crops preceding tobacco it was found that tobacco following lupins had a smaller percentage of mosaic than that following rye, ryegrass and oats with vetches. High rates of fertilizer appeared to increase the percentage of mosaic. Black root-rot: Seedling-beds treated with chloropicrin and D-D in the autumn were free from infection. Sulphur applied to both seedling-beds and tobacco land gave very good control of the disease. Examination of tobacco roots in one experiment showed persistence of benefit from the use of sulphur in the previous season and disadvantage from the use of lime. Tobacco canker: Several varieties showing resistance to *Phytophthora* sp., and 5 showing marked susceptibility are listed. *Composition and quality:* Data are given on the composition of tobacco leaf as affected by preceding cover crops, fertilizers, lime and sulphur.

545. TOBACCO RESEARCH STATION N.Z. AND CAWTHRON INSTITUTE.

Tobacco research annual report for 1952/3, pp. 2

Research work was conducted jointly by the Cawthron Institute and the Tobacco Research Station. Projects included seedbed fumigation for weed control; fertilizers; cultural experiments (spacing, winter cover crops, control of laterals with growth inhibitors); varieties (Virginia Gold and Vamorr 50 showed good yields and good resistance to black root rot and the latter was also resistant to mosaic); breeding; kiln design; disease control (black root rot, *Verticillium*, *Phytophthora* canker); chemical investigations (effect of fertilizers on leaf); and curing experiments.

546. C.S.I.R.O., AUSTRALIA.

Tobacco.

A.R. C.S.I.R.O., Aust., 1951/52, 1952, pp. 20-1, 22-3.

Laboratory trials are in progress at Canberra and field trials at Ayr, Qd. *Quality:* The effects on leaf quality of 3 levels of N and 3 spacings were examined under field conditions. The maximum quality of good leaf was obtained at 20 in. spacing with N at 18 lb. per acre. *Light effects:* An experiment is outlined which confirms

that reduction of light, due to shading in the field or overcast sky, as the crop increases in weight, is one of the most important factors leading to trashy leaf in Australian-grown tobacco. *Control of suckering:* More effective inhibition of sucker growth has been obtained by applying certain mineral oils to the topped plants than with any of the synthetic growth regulators.

547. MINISTER OF AGRICULTURE, CANADA.

Tobacco research in 1952/53.

A.R. Canada Minist. Agric. 1952/53, 1953, pp. 100-2.

Irrigation: At the St. Thomas Substation, Quebec, 1 in. of water applied on 31 July to plots of flue-cured tobacco raised the moisture content of the soil from 2.85 to 15.71% and resulted in average increases in yield, quality and crop value of 229 lb. per acre, 3 cents per lb. and \$135 per acre, respectively. *Fertilizers:* Muriate of potash and sulphate of potash used together gave better quality flue-cured tobacco than either form of potash used alone. *Priming:* Partial priming of burley tobacco, by removing the bottom leaves when ripe and later harvesting the remaining leaves by the stalk-cutting method, improved both the quality and yield of crop. *New varieties:* The flue-cured variety Delcrest is resistant to black root-rot, and 4 other varieties have been successfully tested for resistance elsewhere.

548. U.S. DEPARTMENT OF AGRICULTURE, TOBACCO BRANCH.

Annual Report on Tobacco Statistics, 1952.

Statist. Bull. U.S. Dep. Agric. Prod. Market. Administ. 117, 1953, pp. 71.

Statistics are presented on production, price, stocks, markets, manufactured products, tax rates, consumption, revenue, exports and imports. A brief classification of leaf tobacco gives the classes (flue-cured, fire-cured, air-cured and cigar-filler) and the types and groups within these classes. There is a map showing the producing areas of types other than cigar leaf and another showing the cigar leaf producing areas. [The 1951 report, Statistical Bulletin No. 103, has also been received.]

549. WIJERATNE, W. M.

The mild cigar tobacco industry of Ceylon.

Trop. Agriculturist, 1953, 109: 41-5, bibl. 1.

About 7,000 acres, mainly in the Kandyan hill regions, are devoted to Dumbara types of mild cigar tobacco. Notes are given on nurseries, planting and cultivation, curing and the economics of production.

550. HAYMAN, G. R.

Conservation on a tobacco farm.*Rhod. agric. J.*, 1953, **50**: 223-34, illus.

Soil and water conservation measures, applicable to flue-cured Virginia tobacco farms in Rhodesia, are discussed with particular reference to crop rotation, pasture management, the cutting of timber for fuel, the construction of small dams, the lay-out of land and roads and the alignment of row crop ridges between contours.

Breeding and varieties.

(See also 10.)

551. FRENCH, F. L.

Tobacco experiments. Varietal tests at Nathalia.*J. Dep. Agric. Vict.*, 1953, **51**: 420-4.

An account of the performance from 1949 to 1952 of 6 flue-cured tobacco varieties introduced into Victoria from the U.S.A. and Canada. On the basis of gross monetary return per acre Yellow Special, Virginia Gold and Delcrest are the most promising.

552. TOBACCO RESEARCH BOARD OF SOUTHERN RHODESIA.

Delcrest and Hicks lead variety trials.*Interim Rep. Tob. Res. Bd S. Rhod.* **2**, 1953, pp. 8, illus.

The results are given of variety trials at Kutsaga, Trelawney and Karoi research stations in 1951-52 and 1952-53. Delcrest and Hicks were the best of some 20 varieties. Late planting (December instead of October or November) depressed grade and yield in all cases.

553. RIMANDO, V. C.

A comparison of some aromatic tobacco varieties.*Philipp. Agric.*, 1952, **36**: 27-46, bibl. 9, illus.

Details are given of trials with some Turkish and Virginian aromatic tobacco varieties imported from the U.S.A. with a view to selecting a standard variety for the Philippines. The Turkish varieties matured earlier, were more susceptible to pests and diseases, and yielded a leaf superior to Virginian in burning quality and aroma. The grading was USDA (P.I. 175790 and P.Q. X08865), USDA (P.I. 170567 and P.Q. X04345), USDA (P.I. 170566 and P.Q. X04344), Dixie Bright 101, Dixie Bright 102, Vamorr 48 and Vamorr 50.

554. BOLSUNOV, I.

Versuchsanbau und Züchtung nikotinreicher Tabake in Österreich und deren Aussichten auf Nikotingewinnung. (Austrian experiments on the cultivation and breeding of tobacco varieties rich in nicotine and their suitability for nicotine production.)*Fachl. Mitt. Österreich. Tabakregie*, 1952, Hft 2, pp. 3-9, Hft 3, pp. 7-11, bibl. 17, illus.

The data presented for experiments with *Nicotiana rustica*, carried out in 1947-51, emphasize, among other things, the beneficial effect on nicotine content of topping and of the removal of axillary growth. The results of some recent foreign trials are also discussed.

555. CLAYTON, E. E.

Control of tobacco diseases through resistance.*Phytopathology*, 1953, **43**: 239-44, bibl. 11, illus.

Resistance to the major tobacco diseases can be found in *N. tabacum*, but so far it has been possible to utilize less than half of this resistance in commercial tobacco varieties. The non-usable portion has been consistently associated with poor plant type, yield or quality. The inheritance of resistance obtained within *N. tabacum* is polygenic, with one exception. Despite these handicaps an entire series of valuable commercial varieties has been produced, carrying in varying degree resistance to black root rot, black shank, bacterial wilt and fusarium wilt. Immunity or very high resistance to the major tobacco diseases has been found in various species of *Nicotiana*. Transfers of simple monogenic dominant immunity to mosaic and wildfire have been completed with no apparent association of this immunity with any other plant characters. Similar work is well advanced with root rot immunity and blue mould resistance. All indications are that these transfers from distantly related species, once established in the tobacco genome, can be used far more rapidly and with fewer complications involving type, yield, and quality, than is the case with any resistance found within the cultivated species. [Author's summary.]—*Plant Indust. Stat.*, Beltsville, Maryland.

Composition.

556. VITAGLIANO, M.

Sopra il rapporto nicotina-alcaloidi secondari nel tabacco. Nota 1. Influenza della distanza di trapianto. (On the nicotine-secondary alkaloids ratio in tobacco. Note 1. Effect of planting distance.)*Ann. Fac. Agrar. Portici*, 1950/1951 [issued 1952], **19**: 79-88, bibl. 18.

The spacings used in experiments with Brasile beneventano tobacco in the Salerno district were 0.7 by 0.6 m. and 0.3 by 0.25 m., the former being that recommended by the Tobacco Monopoly and the latter the minimum convenient for cultural operations. The nicotine and nornicotine percentages and the nicotine/nornicotine ratio under the different treatments were: wide spacing unmanured 2.25, 0.35 and 6.42; wide spacing manured 2.6, 0.25 and 10.4; close spacing unmanured 1.4, 0.2 and 7.0; close spacing manured 1.6, 0.2 and 8.0.

557. SASTRY, A. S.

Chemical changes during flue-curing and their bearing on the quality of leaf of cigarette tobacco.*Proc. Indian Acad. Sci., Sect. B*, 1953, **38**: 125-41, bibl. 39.

During the flue-curing of 4 batches of primed leaves of Harrison Special nearly 15% of the total solids originally present in the leaves was lost. Extensive hydrolysis of starch, proteins and other constituents occurred. The contribution of starch to this process was 60-70% while proteins contributed only 7-20%, the reverse of what has been reported for cigar tobacco. The quality of the cured leaf was found to depend on the initial starch content of the leaf.

558. CHATTERJEE, B. G., AND OTHERS.
Determination of nicotine in tobaccos.
Proc. Indian Acad. Sci., Sect. B, 1953, **38**:
 22-6, bibl. 8.

The semi-micro method of distillation used and described is based on that of Griffith and Jeffray, soda lime being used instead of magnesium oxide.

559. ENDEMANN, W.
 Wird der Nikotingehalt der Samennachkommenschaften durch Pfropfungen beeinflusst? (**Has grafting any influence on the nicotine content of the progeny from seed?**)
Züchter, 1953, **23**: 206-7, bibl. 6.

Two tobacco varieties with a high and low nicotine content respectively were used in reciprocal grafts and tomato was also used as a rootstock for both varieties. The data tabulated for 1949 and 1950 show no influence of the rootstock on the nicotine content of the progeny raised from the seed of the grafted parent plants. Several methods of grafting were employed.—Inst. f. Tabakforsch.-Wohlsdorf-Biendorf.

Planting.

560. BOLLI, M.
 Impiego delle sostanze stimolanti la radiazione nel trapianto del tabacco. (**The use of root growth substances in transplanting tobacco.**)
Tabacco, 1953, **57**: 331-5, illus.

Experiments suggest that nursery plants should be treated by watering with synthetic hormones [unnamed] at least a week before transplanting and that the best time for transplanting is as soon as the new roots are clearly visible.—Ist. Orto bot., Univ. Perugia.

561. LIGUORI, O., AND MARTINO, C.
 Prove in pieno campo con prodotti ad azione rizogena. (**Field trials with root-promoting substances.**)
Tabacco, 1953, **57**: 299-313, illus.

Three proprietary root-promoting substances—rootone, aumontan and transplantone—were tested on a Turkish tobacco variety in 1952. The germination rate of treated seed (51-63%) was lower than that of the control (68-73%). Plants arising from treated seed developed faster during the first week after germination. In nursery tests treated and untreated plants developed at the same rate for the first month but after 2 months those treated with rootone showed better development. Plants treated on transplanting struck better than plants not treated. The hormones had no subsequent effect on growth.—Ist. sci. sper. Tabacchi, Lecce.

562. BOLSUNOV, I.
 Anbau von Zigarrentabaken zwischen hochwüchsigem Pflanzen als billige Methode der Beschattung und des Windschutzes. (**The cultivation of cigar tobacco between tall plants as a cheap method of providing shade and windbreaks.**)
Fachl. Mitt. Österreich. Tabakregie, 1953, Hft 1, pp. 13-19, Hft 2, pp. 11-19, bibl. 2, illus.

Preliminary, though detailed and fully documented, trials show that the shade and shelter provided by tall

annuals, such as runner beans, sunflowers, gigas tobacco, etc., improve the leaf quality of cigar tobacco in Austria. Choice of shade plant and date of planting depend on the time the shade is required in a particular locality. Under suitable conditions losses in yield were found to be more than compensated by higher returns from improved quality.

Diseases.

563. WOLF, W. D., AND SHARP, D. G.
Hereditary abnormalities in tobacco.
J. Elisha Mitchell sci. Soc., 1952, **68** (1):
 85-92, illus., from abstr. in *Rev. appl. Mycol.*, 1953, **32**: 456.

An account is given of two heritable structural abnormalities of cultivated tobacco in the United States, "ruffles" and "toad-skin". Both are characterized by leaf enations, in the former on the upper surface and in the latter on the lower. The disorders were not graft-transmitted and no virus particles were found in expressed sap.

564. MATTHEWS, R. E. F.
Chemotherapy and plant viruses.
J. gen. Microbiol., 1953, **8**: 277-88, bibl. 27, illus.

When the guanine analogue, 5-amino-7-hydroxy-1-v-triazolo (D) pyrimidine (guanazolo), was sprayed on the leaves of tobacco or *Nicotiana glutinosa* plants it reduced the number of local lesions and delayed or inhibited systemic spread of lucerne mosaic virus. The virus-inhibitory activity of guanazolo was reversed by adenine, guanine and possibly by hypoxanthine, but not by xanthine, uric acid, theobromine, theophylline, caffeine, uracil or thymine. The triazolo analogue of adenine severely damaged plants and had only slight virus-inhibitory activity. The hypoxanthine analogue caused no plant damage. It was less effective than guanazolo in tobacco and *N. glutinosa* but more effective in reducing the number of local lesions produced in beans. Guanazolo had slight or negligible effects on spotted wilt virus in tomato, potato viruses X and Y in potato, and tobacco and pea mosaic virus in peas. Applied as a leaf spray at 0.01 M concentration guanazolo delayed or prevented systemic movement of cucumber mosaic virus from mechanically inoculated cucumber leaves, but had no effect when watered on the soil. However, watering the compound on the soil gave some control when the virus was introduced by aphids. [From author's summary.]—D.S.I.R., N.Z.

565. WEATHERS, L. G., AND POUND, G. S.
The relation of host nutrition to the multiplication of tobacco mosaic virus in tobacco.
 From abstr. in *Phytopathology*, 1953, **43**:
 488.

The concentration of tobacco mosaic virus in tobacco growing under various levels of N, P, K, and concentrations of balanced solutions was determined. The effects of increasing K and concentration of balanced solutions mainly reflected responses in host growth. With K the virus concentration curve was directly correlated with the growth curve of the host. With variations in the concentration of balanced nutrients there was a close correlation of host growth and virus concentration. The highest local lesion counts and optical density

Readings occurred at the levels of maximum growth. Increasing P resulted in corresponding increases in virus concentration even though at excess P levels growth was markedly stunted. The infectivity of crude expressed juice from plants receiving variations of N was inversely correlated with the increase of N. The virus concentration of purified virus preparations, however, was directly correlated with increase of N. This discrepancy was attributed to an inhibitor in crude extracts, which increased with increase in N. In purification the virus was freed from the inhibitor.

566. ANON.

Efectos de la enfermedad denominada "mosaico" sobre la calidad industrial del tabaco Virginia salteño. (The effects of mosaic disease on the commercial quality of Virginia tobacco in Salta Province, Argentina.)

Idia, 1953, No. 61, p. 7.

Studies showed that the commercial quality of Virginia 402 leaves infected with mosaic (*Nicotiana virus 1*) was lower than that of healthy leaves. Among the defects of diseased leaves were that they deteriorated more rapidly in processing, were slightly darker, were shorter, had a higher nicotine and lower total ash content, and had an inferior aroma.—Estac. exp. nac. Chicoana, Salta Province.

567. HOLMES, F. O.

The tendency of some types of tobacco to escape infection by tobacco-mosaic virus. From abstr. in *Phytopathology*, 1953, 43: 475-6.

The low susceptibility of Java Isère × Cabot to infection by tobacco mosaic virus is confirmed.

568. RODRÍGUEZ SARDIÑA, J.

Examen de los medios de lucha contra los virus. Ensayos españoles de lucha química. (Examination of the methods of virus control. Experiments in Spain on chemical control.) *Bol. Pat. veg. Ent. agric., Madr.*, 1950 (publ. 1951), 18: 129-32, from abstr. in *Rev. appl. Mycol.*, 1953, 32: 421.

White Burley tobacco plants were inoculated with tobacco mosaic virus or a strain of potato virus X before being placed in a nutrient solution either unamended or supplemented by various substances. In the unamended solution they exhibited well-defined symptoms. The addition of a mixture of potassium, sodium and ammonium bromides (10 g., 5 g., and 5 g. in 200 ml. distilled water) delayed the expression of tobacco mosaic symptoms but seriously reduced plant growth and eventually caused chlorosis. Of the sulphamides tested, prontosil (sodium salt of 4-sulphonamido-phenylazo-7-acetylamino-1-oxynaphthalene-3,6-disulphonic acid) was the most promising.

569. GIGANTE, R.

Osservazioni sul verderame delle foglie di tabacco. (Observations on tobacco green spot.)

Tabacco, 1953, 57: 336-53, bibl. 17, illus.

After a short review of the literature on green spot the author describes observations made on this leaf

disorder in 1951 and 1952 and discusses its relationship to mosaic.

570. LUCACCI, G., AND D'ARMINI, M.

Lotta contro l'oidio del tabacco con prodotti solforati a dose ridotta. (Control of tobacco powdery mildew [*Erysiphe cichoracearum*] with sulphur fungicides at low rates.)

Tabacco, 1953, 57: 354-7, bibl. 1.

Wettable sulphur was used at rates ranging from 1/10 N to N (N 1.5%) and Ca polysulphate at 1/20 N to 1/4 N (N 2.0%) on Virginia Bright in experiments conducted in 1950-52 to discover effective doses which did not affect leaf quality. The best rates were found to be 0.3-0.4% wettable sulphur and 0.2-0.3% Ca polysulphate. These treatments are recommended for thin-leaved varieties and for cool rainy summers. The first (preventive) application should be made in the first half of August, only the upper surfaces of the leaves being treated and a fine nozzle being used. A further treatment should be given as soon as the first signs of infection are observed or after persistent heavy rain.—Ist. Pat. veg. Univ. Perugia.

571. D'ARMINI, M.

Esperienze di endoprevenzione condotte con carbonato di litio contro l'oidio del tabacco. (Experiments in the systemic control of tobacco powdery mildew with lithium carbonate.)

Tabacco, 1953, 57: 319-23, bibl. 2, illus.

In experiments conducted in 1952 on Virginia Bright pot plants aqueous solutions of lithium carbonate were applied to the soil at various concentrations and dosages 2 days before inoculation with *Erysiphe cichoracearum*. Twenty-two days after inoculation, when all the controls showed disease symptoms, the 8 plants that had been treated with 0.685% solutions at 500 and 1,000 c.c. per pot were all healthy.—Ist. Pat. veg. Fac. Agrar., Perugia.

572. BAWDEN, F. C., AND KLECZKOWSKI, A.

The behaviour of some plant viruses after exposure to ultraviolet radiation.

J. gen. Microbiol., 1953, 8: 145-56, bibl. 27.

Preparations of tobacco mosaic virus (TMV) inactivated by ultraviolet radiation interfered slightly with infection by active tomato bushy stunt (BSV) and Rothamsted tobacco necrosis (RTNV) viruses, and much more so with active TMV. Similarly, inactivated RTNV interfered slightly with infection by TMV and more so with active RTNV. In contrast, inactivated BSV did not affect the numbers of lesions produced by active virus preparations. The residual infectivity of irradiated preparations of RTNV and BSV was greater when inoculated plants were exposed to light than when they were kept in the dark. This occurs because of some light-sensitive mechanism in the host cells, and exposing the irradiated virus preparations to visible light did not affect their infectivity. Irradiated preparations of TMV had the same residual infectivity whether plants were placed in the light or dark after inoculation. Although the three viruses have particles of different sizes and shapes, the course of inactivation by ultraviolet with each approximated closely to that of a first-order reaction. [Authors' summary.]—Rothamsted exp. Stat.

573. TAYLOR, G. S.

Control of tobacco blue mold by root application of zineb and ferbam.From abstr. in *Phytopathology*, 1953, 43: 486.

An account is given of tests with AST shade tobacco which showed that both zineb and ferbam can act as chemotherapeutants under some conditions.

Nematodes.

574. SASSER, J. N., POWERS, H. R., JR., AND LUCAS, G. B.

The effect of root-knot nematodes (*Meloidogyne* spp.) on the expression of black shank resistance in tobacco.From abstr. in *Phytopathology*, 1953, 43: 483.

The presence of *Meloidogyne* sp. greatly reduced the resistance to black shank (*Phytophthora parasitica* var. *nicotianae*) of tobacco seedlings of the black-shank-resistant varieties under trial.

575. KLINDIĆ, O.

Korjenova nematoda u Hercegovini. (Root-knot nematode in Herzegovina.) [English summary $\frac{1}{2}$ p.]*Zasht. Bilja*, Belgrade, 1953, No. 18, pp. 3-17, bibl. 10, illus.

Symptoms of *Heterodera marioni* infestation, particularly of tobacco, are described. In control trials calcium cyanamide showed some promise, but chloride of lime and a BHC preparation were totally unsatisfactory.

Curing.

576. ASKEW, H. O.

Respiration in plants—with special reference to the flue-curing of tobacco.Reprinted from *J. N.Z. Inst. Chem.*, 1953, 17 (2), pp. 12.

The author deals with his subject under the following headings: flue curing process, carbohydrates, the part of organic acids, the importance of phosphates, protein breakdown and finally experimental results with tobacco.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(See also 615h, 837, 1045.)

578. VARMA, P. M., AND CAPOOR, S. P.

"Marble" disease of cardamom.*Indian Fmg.*, 1953, 3 (5): 22-3, illus.

The destructive marble or mosaic disease of cardamom, *Elettaria cardamomum*, is caused by a virus transmitted by the aphid *Pentalonia nigronervosa* but not by mechanical means. Experience in North Kanara in Bombay has shown that the disease can be effectively controlled on an area basis by initial eradication of all old and diseased cardamom plants followed by replanting with healthy seedlings and regular roguing.

Noted.

577.

a D'ARMINI, M.

Effetti di "colpo di sole" su tabacco Bright. (Effects of sun scorch on Bright tobacco.)*Tabacco*, 1953, 57: 314-18, bibl. 1, illus.

b BATRA, B.

Cultivation of tobacco in the Jullundur district of the Punjab (India).*Indian Tobacco*, 1953, 3: 127-31, illus.Varieties of *N. tabacum*, nursery and field practice, and curing.

c BROWN, J. C., AND STEINBERG, R. A.

Iron and copper enzymes in leaf lamina of tobacco when deficient in micronutrients or grown on calcareous and organic soils.*Plant Physiol.*, 1953, 28: 488-94, bibl. 11.

d CROP REPORTING BOARD, U.S. DEPARTMENT OF AGRICULTURE.

Farm production, farm disposition and value of principal field crops. Revised estimates 1944-49.*Statist. Bull. U.S. Dep. Agric.* 115, 1952, pp. 91.

Includes data for the separate producing States on tobacco and maple production.

e KADAM, B. S., AND SAJNANI, B. T.

Survey of hookah and chewing tobaccos in Darbhanga district of Bihar.*Indian Tobacco*, 1953, 3: 133-8.Varieties of *N. tabacum* and *N. rustica*, nursery and field practice, and curing.

f WILLITS, C. O., GASPAR, M., AND NAGHSKI, J.

Collaborative study of methods for analysis of tobacco. Nicotine and moisture.*J. Ass. off. agric. Chem. Wash.*, 1953, 36: 1004-18, bibl. 4.

g ŽUKOV, N. I.

Some problems of the biology of fertilization in tobacco. [Russian.]*Agrobiologija*, 1951, No. 3, pp. 140-3.

Results of pollination trials at 2 Russian tobacco research centres.

579. BROWN, E., AND READER, D. E.

The cultivation and marketing of pepper.*Colon. Plant Anim. Prod.*, 1952/3, 3: 195-205, bibl. 9.

Piper nigrum is indigenous to the moist lowland forests of Ceylon and South India, the chief sources of supply now being Indonesia, Thailand, Sarawak and India. Notes are given on propagation from seed and from cuttings, cultivation, including supports—generally living trees such as the jak tree, areca nut, mango, etc.—spacing, manuring, pruning, and pests and diseases. Its productive life, varying according to conditions, is 12-20 years. Cropping rises to 3-4 lb. dry pepper per vine in the 7th year. The products are black pepper,

namely whole dried berries, and white pepper, namely fully ripe decorticated fruit. Notes are given on the preparation of these products and on the characters of the different types produced in different places. Before the war Indonesia supplied 80% of world supplies. During the war the gardens became derelict and supplies became very scarce. They have now become available again.

580. ANON.

Tonka bean culture is source of growing income.

Venezuela up-to-date, 1953, 4 (6): 11, from abstr. in *Trop. Abstr.*, 1953, 8, No. 2226.

Two species of the tonka bean tree (whose seeds yield coumarin) occur in Venezuela: *Coumarouna odorata* and *C. oppositifolia*. Tonka bean exports reached 375,000 lb. in 1952.

581. BHAT, J. V., AND BROKER, R.

Riboflavine and thiamine contents of saffron, *Crocus sativus* Linn.

Nature, 1953, 172: 544, bibl. 2.

The stigmas of *Crocus sativus* were found to have an exceptionally high content of riboflavine. For comparison the vitamin B₂ values of some other food and spice plants are also tabulated.—St. Xavier's Coll., Bombay.

Drug plants.

(See also 48, 615a, b, e, f, n, 1039, 1055.)

582. DEANON, J. R., Jr.

A trial planting of some drug and condiment plants.

Philipp. Agric., 1952, 36: 5-18, bibl. 2, illus.

Of ten species under trial at the College of Agriculture, Los Baños, Laguna, only *Anethum graveolens* (dill), *Chenopodium ambrosioides* (American worm-seed), *Atropa belladonna* and *Datura stramonium* reached maturity.

583. KAPOOR, L. D., HANDA, K. L., AND CHOPRA, I. C.

Cultivation of medicinal plants in Kashmir.

J. sci. industr. Res., India, 1953, 12A: 311-16, bibl. 5.

India at present imports large quantities of manufactured preparations derived from drug plants which she could herself produce. *Digitalis purpurea*, *D. lanata*, *Atropa belladonna* are among plants already grown commercially in Kashmir. In this paper notes are given of the successful experimental cultivation of the following additional drug plants, and of their drug contents: *Anethum graveolens*, *Atropa acuminata*, *Artemisia acuminata*, *Chenopodium ambrosioides* var. *anthelminticum*, *Datura stramonium*, *Glycyrrhiza glabra*, *Hyoscyamus niger*, *H. muticus*, various *Mentha* species, *Ocimum kilimandscharicum*, *Physochlaina praealta*.

584. TOMOVA, M.

Studies on the forms of *Artemisia maritima* common in Bulgaria, with special reference to their vermifugal constituents. [Bulgarian, with Russian and German summaries $\frac{1}{2}$ p. each.]

Izv. bot. Inst. Sofia, 1951, 2: 141-62, bibl. 30.

Varieties of *Artemisia maritima*, especially var. *salina*, contain appreciable quantities (about 2%) of santonin.

585. KITANOV, B.

Plants used in folk medicine. [Bulgarian.]

Izv. bot. Inst. Sofia, 1953, 3: 249-56.

A list is given of 35 human diseases and ailments with plants recommended for their cure.

586. DIFFIDENTI, G. H.

La valeriana od erba gatto. (Valerian.)

Flora sal., 1953, No. 1, from abstr. in *Ital. agric.*, 1953, 90: 349-50.

A short note is given on *Valeriana officinalis* and its medicinal products. Other medicinal and ornamental species of the genus are mentioned.

587. MONACHINO, J.

Fruits of *Strophanthus sarmentosus*.

Gdn J. N.Y. bot. Gdn, 1953, 3: 159, illus.

Notes on the habit of *Strophanthus sarmentosus* and on the doubtful prospects of growing it in Louisiana and California. Fruits are scarce in cultivated plantations. The plant is being studied at the New York Botanical Garden and the Boyce Thompson Institute among other places.

588. KAPOOR, L. D., HANDA, K. L., AND CHOPRA, I. C.

Cultivation of *Hyoscyamus niger* Linn.

J. sci. industr. Res., India, 1953, 12A: 238-41, bibl. 4.

Henbane grown in Kashmir at 5,000 ft or more had alkaloid contents equal to, or above, B.P. or U.S.P. standards, whereas in trial plots at lower elevations contents were lower. Observations are made on the cultivation of the crop, its pests and diseases, harvesting, drying, and yields.

589. AUXENCE, E. G.

A pharmacognostic study of *Piscidia erythrina*.

Econ. Bot., 1953, 7: 270-84, bibl. 34, illus.

An account is given of the anatomy of the bark, stem and leaves of this West Indian medicinal plant, known in the U.S.A. as Jamaica dogwood. Literature on the tree is reviewed.

590. WAINSTEIN, P.

Ensayos de rendimiento en morfina de amapola (*Papaver somniferum* var. *nigrum*). (Opium poppy yield trials.)

Rev. Fac. Cien. agrar. Mendoza, 1951, 3 (2): 37-8.

The morphine content of dry capsules at 50-60° C. was 2.2‰ in both mature and slightly immature capsules from July-sown plants and the capsule yield was about 1,700 kg. per ha. in both cases; the figures for slightly immature capsules from August-sown plants were 3.3‰ and 900 kg.

Essential oils.

(See also 615g, i, n, 836, 1050.)

591. WAYGOOD, W. A.

Essential oils.

Reps Progr. appl. Chem., 1952, 37: 201-15, bibl. 171.

A review of the recent literature on essential oils and their plant sources.

592. KHAN, K. F., AND KRISHNASWAMY, A. R.
A new essential oil of nutmeg, *Myristica fragrans* Houtt., and its possible economic uses.

Sci. and Cult., 1953, 19: 186-8, bibl. 4.

The characteristics are given of an aromatic oil extracted by distillation in yields of 0.41 to 0.62% from nutmeg leaves. Sprayed undiluted onto 5 common weeds the oil showed marked phytocidal action. It is thought that it may be of value in the preparation of toilet and medicinal products and for flavouring.

593. ČELJADINOVA, A. I., AND SVJATELIK, N. A.
Means of increasing the hardness of pepper-mint. [Russian.]

Agrobiologija, 1951, No. 1, pp. 34-9, illus.

The yield and essential oil content of peppermint, *Mentha piperita*, are highest in crops harvested when about 50% of the shoots are in flower. For maximum rhizome production in the Moscow region, however, late harvest of special mother plantations is recommended, to ensure a better maturation of the late maturing underground parts. The recommendation is made that the plants should be covered for the winter with straw, dry manure or similar waste material.

Fibres.

(See also 395, 835, 836, 1038, 1050.)

594. DUTHIE, D. W.
Fertilizer responses in East Africa.
Nature, 1953, 172: 564-6, bibl. 1.

Pineapple in Zanzibar gave good response to nitrogen, both the number and the size of fruit being increased during the first two seasons. Neither pyrethrum nor healthy sisal benefited from nitrogen or potash-applications, but excess K caused chlorotic mottling in sisal, although banding disease, which is prevalent in Tanganyika, is primarily due to K deficiency. The calcium requirements of sisal are high. With coffee, mulching has proved much more effective than compost or cattle manure; it should be applied at the onset of the rainy season.

595. SPENCER, J. E.
The abacá plant and its fibre, Manila hemp.
Econ. Bot., 1953, 7: 195-213, bibl. 22, illus.

This review is concerned with the plant and its ecology, propagation, diseases and pests, harvesting and preparation, utilization, and production and trade.

596. CARAG, A. T.
Comparison of two methods of cleaning abacá fibers in the U.P. College of Agriculture.
Philipp. Agric., 1952, 36: 69-82, bibl. 3, illus.

Hand and machine extraction of *Musa textilis* fibre were compared. The former gave a higher fibre yield and greater tensile strength and fineness. The outermost leaf sheaths gave the highest fibre yield and the highest tensile strength, and the innermost the finest fibre.

597. LOEGERING, W. Q.
Marasmius stenophyllus on abaca (*Musa textilis*) in Central America.
From abstr. in *Phytopathology*, 1953, 43: 479.

Symptoms, varietal incidence, ecology and spread. Incidence of the disease can be reduced by sanitation in harvesting procedures and losses can be reduced by harvesting infected plants before extensive deterioration has taken place.

598. LEJEUNE, J. B. H.
Contribution à l'étude des plantes à fibres, à Rubona. (Contribution to the study of fibre plants at Rubona.)
Bull. agric. Congo belge, 1953, 44: 743-72, illus.

This paper includes a note on a trial with the perennial *Abroma augusta* which is ideally suited to conditions at medium elevations in Ruanda Urundi. The growing cycle was 24 months, and cuts at 18 and 24 months gave fibre yields of 1,200 and 716 kg. per ha. respectively. The yield of green matter, returnable to the soil, is high (41%). The uses of *Abroma augusta* fibre and of those of various species of *Sansevieria* and *Agave* are mentioned.

599. CAPOT, J., AND OTHERS.
Recherches sur une plante à fibres: l'*Abroma augusta* L.F. (Research on a fibre plant: *Abroma augusta*.)
Sér. tech. I.N.E.A.C. 42, 1953, pp. 113, bibl. 67, illus., 100 fr.

This detailed study of the shrub *Abroma augusta*, which yields a substitute for jute, covers its botany, ecology, culture in the Belgian Congo, and the harvesting, processing, properties and uses of its fibre. Its major cultural problems have been solved and it is considered that world political and economic factors now favour a planting programme that would free Belgium from the Anglo-Indian jute monopoly. The plant does well in the equatorial Congo basin (Yangambi); the optimum mean annual temperature appears to be 25-30° C., the minimum mean annual temperature 15° C., the optimum rainfall 1,800-2,500 mm. p.a., well distributed, and the minimum 1,200 mm. The plant prefers deep alluvial soils and does not like a high water table. Trials showed that the optimum field spacing is 0.4 by 0.4 m. or 1.0 by 0.2 m., the minimum sowing depth 7 cm., and the best sowing dates August and December. Seed ripens in 5-6 months. Harvesting at 20-25 cm. above ground begins 3-4 months after sowing. The plant coppices vigorously and generally 2 cuts are obtained each year. It is usually grown as a biennial, yields for the 2-year cycle ranging from 1,000 to 1,500 kg. dry fibre per ha.

600. CASTRO, G. P.
Resultados sobre adubação do rami. (The effects of manuring ramie.) [English summary 7 lines.]
Bragantia, 1951, 11: 307-11, bibl. 3.

Ramie (*Boehmeria* spp.) was subjected to 8-plot tests. At Campinas P in one test and N in another gave yield increases. At Pindorama P gave a significant increase.

601. ARANETA, R. R., Jr.
Effects on the quality and amount of fiber extracted of immersing ramie stalks in water before decortication.
Philipp. Agric., 1953, 36: 140-57, bibl. 6, illus.

Fresh stalks of 4 ramie varieties immersed in water for

3-5 days before decortication produced finer, softer, paler fibre than untreated material. The fibre yield of immersed stalks was significantly less than that of untreated material in 3 varieties (1.98-3.92% compared with 4.28-6.54%). The tensile strength of the untreated fibres was significantly greater in 2 varieties and not significantly different in the other 2.

602. STANT, M. Y.

Variations in reed structure in relation to thatching.

Kew Bull., 1953, No. 2, pp. 231-8.

As regards the thatching qualities of English reeds, reeds from Norfolk are pre-eminent. Their superiority is not only indicated by appraisal with the naked eye but is disclosed by anatomical examination, which reveals their greater lignification and a more pronounced absence of air cavities.

603. GANGSTAD, E. O., JOYNER, J. F., AND SEALE, C. C.

The effect of cultural treatments on the frost injury and growth of sansevieria in South Florida.

Trop. Agriculture, Trin., 1953, 30: 171-7, bibl. 7.

Among *Sansevieria* species tested at 5 locations in South Florida *S. thyrsoiflora* showed the most frost injury, *S. longiflora* and *S. trifasciata* were intermediate, and *S. trifasciata* var. *laurentii* showed least damage [see also *H.A.*, 22: 4101]. Various cultural treatments applied to leaf cuttings of *S. trifasciata* had no effect on survival at 3 months or establishment of plants at 9 months, although mulching with wood pulp significantly increased the number of frosted cuttings at 4 months. The cold tolerance of a 2-year stand of *S. trifasciata* was, however, improved by clean cultivation and by proper manuring, particularly with N and K. The number of plants per sq. ft was not significantly affected by frost injury to aerial portions; leaves injured by cold did not resume growth, but undamaged leaves continued to grow and the general height of the stand increased.

Hops.

(See also 10, 207, 615j, 1038, 1047.)

604. CAWTHRON INSTITUTE AND D.S.I.R., N.Z.

Hop Research Annual Report for 1952/53,
1953, pp. 2.

Further progress is reported in equipping the hop research station. Notes are given on fertilizer trials, magnesium and boron deficiency phenomena, brewing values of imported and local varieties, breeding, verticillium wilt, in-curling of leaf margins, and resistance to black root rot.

605. CAWTHRON INSTITUTE.

Brewing value of hop varieties.

A.R. Cawthron Inst. 1952/53, p. 27.

Some 68 samples of cured hops, representing seedlings of 16 English and 6 New Zealand varieties, were tested for resin and total solids contents; preservative values were then calculated. The results showed that the English varieties were generally higher in resins and thus higher in preservative value than local varieties.

Great variations in the resin content occurred in individual plants of the same variety.

606. CAWTHRON INSTITUTE.

Intake of plant nutrients by hops.

A.R. Cawthron Inst. 1952/53, pp. 19-20.

Hop plants were analysed for certain major and minor elements and the composition of the individual organs, cones, leaves, etc., is given. From the data presented it is apparent that in heavy crops, such as those from which the data were obtained, large amounts of plant nutrients are removed, which over a number of years would lead to impoverishment of the garden. Thus the quantities of Mg, P, K and N in the cones represent an annual loss of approximately 1 cwt. of dolomite, 2 cwt. of superphosphate, 2 cwt. of sulphate of potash and 4 cwt. of sulphate of ammonia respectively per acre.

607. HARRIS, G., AND TATCHELL, A. R.

Amino acids and peptides of hops and wort.

III. The amino acids of fresh hops.

J. Inst. Brew., 1953, 59: 371-7, bibl. 30.

The amino acids and bases of fresh hops have been concentrated by means of ion-exchange chromatography. Two-dimensional paper chromatography of the concentrates has revealed the presence of the amino acids previously noted in kilned hops together with additional amino acids and allied compounds, these including gamma-methylene glutamine and gamma-methylene glutamic acid. [Authors' summary.]

608. HUNT, O. J.

Determination of sample size for evaluating resistance of downy mildew in hops.

Agron. J., 1953, 45: 406-8, bibl. 8.

Twenty-one varieties or strains of hop from Corvallis, Ore., formed the investigational material. There were three variables or components in the sampling error, namely leaves, suckers, and plants. A comparison was made by the analysis of variance, and the relative efficiency of varying apportionments of these components is presented. Results indicate that efficiency is increased much more rapidly by increasing the number of plants per plot sampled while taking a correspondingly smaller number of suckers per plant. Increasing the number of leaves per sucker apparently gives very little additional information. Since the number of plants available may often be limited, efficiency may in such cases be increased by increasing the number of suckers per plant with a minimum number of leaves per sidearm.

609. HARRIS, R. V.

New verticillium wilt tolerant hop varieties.

Annual Booklet of the Association of Growers of the New Varieties of Hops, 1953, pp. 10-15.

On some wilt-tolerant, but not completely resistant, varieties, viz. Seedling 1147, Wye Seedling OT48 "Bramling Cross" and East Malling Seedlings of the C, D, and J series.

610. PREECE, I. A., AND MACLEOD, A. M.

Brewing, malting and allied processes.

Reps Progr. appl. Chem., 1952, 37: 165-89, bibl. 278.

The review includes a short section on hops (pp. 168-70) in which disease-resistant varieties, picking by machine, and hop chemistry are discussed.

Insecticidal plants.

(See also 594, 615m, 835.)

611. SCHMIDT, G.

Zur Frage der insektiziden Wirksamkeit von Taxus-Extrakten. (The insecticidal action of yew extracts.)

NachrBl. dtsh. PflSchDienst., Braun-schweig, 1953, 5: 124-5, bibl. 15.

The absence of aphids on *Taxus baccata* led to the study of the possible insecticidal action of needle extracts. The results were negative.—Biol. Zentralanst., Berlin-Dahlem.

Seed oils.

(See also 835, 841, 1050.)

612. MAŽDRAKOV, P. D.

Xanthium italicum as a source of oil.

[Bulgarian, with Russian and German summaries 1½ pp. each.]

Izv. bot. Inst. Sofia, 1953, 3: 207-16, illus.

The seeds of cocklebur contain 22.74–29.3% oil of yellow colour, characteristic odour and mild flavour. Methods of harvesting and shelling the seed, industrial extraction of the oil and utilization of waste products are briefly discussed.

613. NARAIN, A.

Artificial production of tetraploids in *Ricinus communis* Linn.

Curr. Sci., 1953, 22: 268-9, illus.

A 0.3% solution of colchicine induced polyploidy in apical meristems and germinating seeds of castor plants, whereas lower concentrations had no effect and slightly higher concentrations killed all the shoots.

Sundry plants.

614. EISSES, J.

Seaweeds in the Indonesian trade.

Indon. J. nat. Sci., 1953, 109: 41-56, bibl. 11.

Data are given on the use of seaweed in Indonesia for export, food and agar manufacture. Tables show the species used and their agar contents.

Noted.

615.

a ADAMS, R., AND VAN DUUREN, B. L.

Usaramoensine, the alkaloid in *Crotalaria usaramoensis* E. G. Baker. Integerrimine from *Crotalaria incana* Linn and senecionine from *Senecio glabellus* D.C. Stereochemical relationships.

J. Amer. chem. Soc., 1953, 75: 4631-5, bibl. 28.

b ADAMS, R., AND VAN DUUREN, B. L.

Riddelliine, the alkaloid from *Senecio riddellii*. II. The structure of riddellie acid and the total structure of riddelliine.

J. Amer. chem. Soc., 1953, 75: 4638-42, bibl. 14.

c AGHORAMURTHY, K., AND SESHADRI, T. R.

Chemical investigation of Indian lichens: Part XV—A species of *Parmelia* containing lichexanthone.

J. Sci. industr. Res., India, 1953, 12B: 73-6, bibl. 4.

d BANIGAN, T. F., JR., AND MEEKS, J. W.

Isolation of palmitic, stearic and linoleic acids from guayule resin.

J. Amer. chem. Soc., 1953, 75: 3829-30, bibl. 14.

e BOIČINOV, A.

Artemisia maritima as indigenous raw material for the production of santonin. [Bulgarian.]

Izv. bot. Inst. Sofia, 1953, 3: 266-8.

f CAPOOR, S. P., AND VARMA, P. M.

Studies on the "distortion mosaic" virus of *Datura innoxia* Mill.

Indian J. agric. Sci., 1952, issued 1953, 22: 303-14, bibl. 15, illus.

g MCCAUGHEY, W. F., AND BUEHRER, T. F.

Terpenes in the essential oil of *Haplopappus laricifolius* Gray.

J. Amer. chem. Soc., 1953, 75: 4851, bibl. 6.

h MARINET, J.

La situation actuelle de la pipéri-culture indochinoise. (The present position of the black pepper industry in Indo-China.)

March. col. Monde, 1953, 9: 2315-16, from abstr. in Trop. Abstr., 1953, 8, No. 2227. Cultivation methods are described.

i MILLER, J. M., AND KIRCHNER, J. G.

Chromatostrips for identifying constituents of essential oils.

Anal. Chem., 1953, 25: 1107-9, bibl. 4.

j MINISTRY OF AGRICULTURE, LONDON.

Verticillium wilt of hops.

Adv. Leaf. Minist. Agric. Lond. 413, 1953, pp. 4.

k NORTON, D. C., AND FRANK, F. A.

Charcoal rot (caused by *Sclerotium bataticola* Taub.) on guayule in southwest Texas in 1951-1952.

Plant Dis. Rept., 1953, 37: 41-3, bibl. 5.

l RIBAS, I., AND SEOANE, C.

Alcaloides de las Papilionaceas. XIX. Contenido en alcaloides del *Spartium junceum* L. cultivado en Galicia. (Alkaloids of the Papilionaceae. 19. Alkaloid content of *Spartium junceum* grown in Galicia.) [English summary 8 lines.]

An. Edaf. Fis. veg. Madrid, 1953, 12: 695-701, bibl. 7.

m SCHOENMAECKERS, J.

Quelques observations sur la culture du pyrèthre au Kivu et au Ruanda-Urundi. (Notes on pyrethrum growing in Kivu and Ruanda-Urundi.)

Bull. Doc. Tech. agric., 1952, 6 (22): 3-22, from abstr. in Trop. Abstr., 1953, 8, No. 2174. Erosion control, maintenance of soil fertility and *Ramularia* disease control by selection.

n SHARMA, M. R. G., VARADHAN, C., AND SASTRY, S. G.

Bellary leaf oil.

J. sci. industr. Res., India, 1953, 12B: 243-5, bibl. 12.

Constituents of oil distilled from leaves of *Litsea zeylanica*.

FLORICULTURE.

General.

(See also 2, 6, 52-55, 78, 79m, 80g, 258, 392-394, 424, 498, 1022, 1040, 1057, 1061a, d, e, h.)

616. SPYROS PARASCHIS, M.

Parks and avenues in the Greece of 1600 B.C.

J. roy. hort. Soc., 1953, **78**: 408-13, illus.

Evidence of the magnificence of parks in Crete and of the love of Greeks for ornamental gardens is adduced from paintings and literary sources.

617. "DE PROEFTUIN" TE BOSKOOP.

Jaarboek uitgegeven door de Vereniging "De Proeftuin" te Boskoop, 1952. (Yearbook of the Society "De Proeftuin" [The Trial Garden], Boskoop, 1952), pp. 75.

The experiments are concerned mainly with ornamental trees and shrubs. Most of the items have been abstracted separately. Those not abstracted deal with the leaf spot of rhododendron, mildew and other diseases of *Rosa rugosa*, propagation of walnuts and roses, breeding and selection of ornamentals, and forcing forsythia.

618. VAN ONSEM, J.-G., AND DE GROOTE, R.

La Station de Recherches de l'État pour l'Amélioration des Plantes Ornamentales. (The State Research Station for the Improvement of Ornamental Plants.)

Bull. hort., Liège, 1953, **8**: 253-6, illus.

The Research Station was established at Ghent in 1946. The more important subjects of study have been the breeding of tuberous-rooted begonias, azaleas, dahlias and orchids, the application of plant growth substances to propagation by cuttings, fertilizer trials, the cultivation of azaleas in vermiculite and in peat, artificial illumination, orchid germination, use of town refuse as manure, mineral nutrition, artificial humidification of air in greenhouses, and hydroponics.

619. MOTT, R. C.

Seed germination in saturated atmosphere.

Bull. N. Y. St. Flower Grs, 1953, No. 97, p. 5.

A description is given of the successful propagation from seed of numerous flowering plants using pint Mason jars filled with a 50-50 mixture of peat moss and washed concrete sand. This was compacted to within an inch of the top of the jar and the surface was covered with a shallow layer ($\frac{1}{4}$ in.) of coarse quartz sand. A 0.25% solution of the fungicide vancide 51 was poured over the surface, and was retained in the jar under cover for 48 hours. The surplus was then poured off and the jars left for 2 days before sowing. Before sowing, large seeds were dipped in a full strength solution of vancide 51. Germination took place at temperatures of 65-75° F., or for snapdragons of 50-60° F.

620. (FRUHSTORFER, A.)

Die betriebswirtschaftliche Bedeutung der Einheitserde. (The significance of the standard potting soil.)

Tech. Bauern Gärt. Ausg. G., 1953, **5**: 59-60.

HÜLSMANN, B., AND THIELE, K. P.

Kulturversuche mit Einheitserde zu Zierpflanzen. (Growing ornamental plants in a standard potting soil.)

Gartenwelt, 1953, **53**: 251-4, illus.

The standard rooting medium, evolved by Professor Fruhstorfer, consists of a mixture of 50% sterile clay, 25% white peat and 25% black peat plus 6‰ nutrient salts (1.5‰ pure nutrients) in the case of potting soil and plus 3‰ salts in the case of pricking out soil. In the first article, the report of a paper read in January 1953, Professor Fruhstorfer discusses the advantages of the medium, which include stability of soil structure and pH (5.5), absence of rotting bacteria, fungi and weeds and low cost thanks to centralized production on a large scale. The subject was discussed more fully in earlier articles (*Ibidem*, 1952, Vol. 4, Nos. 17, 18 and 19).

The second paper is a detailed account of experiments carried out with the standard medium at the Versuchsgärtnerei Kleefeld of the Landwirtschaftskammer Hannover. *Begonia semperflorens*, *Primula obconica*, gloxinia, hydrangea and other pot plants were found to make better growth and to flower earlier than controls grown in ordinary potting soil.

621. FISCHER, C.

Long-term holding of cut flowers.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 585-92, bibl. 9.

Carnations, pompon chrysanthemums, roses, lily-of-the-valley and garden lilies stored most successfully at temperatures of 31° F. Flowers stored in a dry condition (no free water), enclosed in a moisture-proof package, were generally superior to those stored at the same temperatures but with cut stems in water or Floralife. Severity of mould injury on flowers stored under the high humidity conditions of confined packages was dependent on temperature and was far greater at temperatures of 35°-45° F. than at 31°-35° F. [Author's summary.]—Cornell Univ.

622. SCHUMACHER, W.

Weitere Beobachtungen über das Welken ephemerer Blüten. (Further observations on the wilting of ephemeral flowers.)

Planta, 1953, **42**: 42-55, bibl. 12, illus.

Exposure to a temperature of +5° C. on opening prolonged the life of ephemeral flowers after cutting 30-60 times. Flowers treated on opening with a weak dosage of HCN or kept in an oxygen-free atmosphere had a life about 5 times the normal duration. Conclusions on the nature of the processes involved are drawn from these and some other findings. The experiments were carried out at Bonn University with *Hydrocleis*, *Convolvulus*, *Oenothera*, *Pharbitis*, *Ipomoea* and *Tigridia* spp.

623. ANON.

Zwei neuartige Blumentöpfe. (Two new flower pots.)

Schweiz. Gärtnerztg., 1953, **56**(32): 1-3, illus.

The two Dutch models of flower pot described and illustrated (Provista and Walu) combine the advantages of soil and water culture of house plants.

624. STINSON, R. F., AND KEYES, C. G.

Preliminary report on copper and zinc naphthenate treatments to control algae growth on clay flower pots.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 569-72, bibl. 1, illus.

A 3% copper sulphate solution used as a dip was not effective in controlling the growth of green algae on clay flower pots. Although a 3% zinc naphthenate solution dip was effective for six months, it was harmful to the growth of geraniums, cyclamen and several other plants. Copper naphthenate dips at various concentrations and with several carriers gave control of algae for six months, but resulted in restricted root growth of geraniums, though without appearing to affect top growth [From authors' summary.]—Storrs agric. Exp. Stat., Conn.

625. LEACH, A.

Brookins rotary grader.

Bull. N.Y. St. Flower Grs, 1953, No. 98, pp. 4-6, illus.

A description, with constructional diagrams, is given of a time-saving system of weight grading for flowers. The main features are a turn-table carrying 4 spring balance scales from which the graded flowers are passed to a curved sorting table containing 5 separate bins. The usual dials on the scale are replaced by coloured charts consisting of concentric circles with segments in colour corresponding to standard grade labels. The same colours are used for the grade bins and for cloth slings used for lifting batches of graded blossoms. Two people operate the grader, one placing the flowers on the pans as the scales pass by and the other reading the scales and transferring the flowers to the grade bins.

626. JEFFERSON, R. N.

The control of slugs.

Flor. Rev., 1952, **111** (2869): 29-30, 123-7, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 98, p. 7.

Several species of slugs and snails attacking ornamentals were controlled with metaldehyde sprays and dusts. Fifteen and 20% dusts were as effective as the 50% wettable powder used at the rate of 6 lb. per 100 gallons. Three or more applications of a 15% dust at 7- to 10-day intervals were recommended for greenhouse use. All plants tested were tolerant to applications of metaldehyde.

Annual and herbaceous plants.

(See also 735a, b, c, f, m, n, o, p, s, v, 1036.)

627. ODOM, R. E.

Carnation mother stock must have ample nitrogen.

Colo. Flower Grs' Ass. Bull., 1953, No. 46, pp. 1, 3, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 98, p. 7.

Carnation plants from mother plants fertilized with adequate nitrogen rooted slightly better but grew much better than those from low nitrogen stock. Phosphorus and potash levels had little effect on rooting or later growth.

628. OKU, L.

Carnation cuttings.

Flor. Rev., 1953, **112** (2898): 27, 71-2, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 98, p. 7.

Unrooted carnation cuttings, tied in bundles and packed in cellophane bags, were stored at 31° F. for 2 to 3

months. Upon removal from storage, the rooting percentage was comparable to that for non-stored cuttings. Rooted cuttings placed in flats lined and covered with polyethylene were also stored successfully for several months. No growth or premature budding occurred at 31° F.

629. CHESHUNT.

Carnations.

A.R. Cheshunt exp. Res. Stat. 1952, 1953, p. 20.

In trials in 1952 the highest number of flowers was produced by the variety White Maytime. Beds over bricks and drain-tiles were somewhat better than the control beds in direct contact with the soil below, but the highest yield came from well-drained beds in troughs.

630. LUNT, O. R., SCIARONI, R. H., AND BOWLES, E. J.

Studies in fertility control of commercially grown carnations.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 523-7, bibl. 9.

It is suggested that, when carnations are grown under conditions similar to those of the studies described, monthly applications of 0.25 to 0.40 lb. N, quarterly applications of 0.15 to 0.25 lb. K₂O and annual applications of 1 lb. of P₂O₅ per 100 square feet will meet the needs for these elements and obviate the need for soil testing. The rates and frequency of application may have to be modified according to soil texture, sandy soils receiving more frequent and lighter applications than clay soils. [From authors' summary. A shorter account of this work was abstracted in *H.A.*, 23: 4421.]—Univ. Calif.

631. HOLLEY, W. D.

Potassium, sodium and calcium nutrition of carnations.

Colo. Flower Grs' Ass. Bull., 1953, No. 47, pp. 1-3, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 98, p. 8.

Seven pounds of muriate of potash per 100 sq. ft. applied over the year increased production of carnations compared with a virgin soil not given potassium. Applications of gypsum had no effect on yield. Neither had any effect on quality. Sodium applied as stock salt improved the grade cut but did not affect production. The fertilizers had little effect on keeping quality.

632. HOLLEY, W. D.

Carnations are tolerant to a wide range of soil moistures.

Colo. Flower Grs' Ass. Bull., 1953, No. 46, p. 2, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 98, p. 7.

Carnations watered when tensions of 9, 15 and 21 inches of mercury were attained from 1 August to 30 April gave no differences in production. Those watered at 9 inches of tension required 47 waterings while at 21 inches they required 26 waterings.

633. HALLIDAY, W. G., AND WATSON, D. P.

Influence of temperature on the flowering and calyx splitting of greenhouse carnations.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 538-42, bibl. 3, illus., being *J. Art. Mich. agric. Exp. Stat.* **1400**.

Experiments at Michigan State College in 1950/51 indicated that there was a marked difference in varietal response to temperature. Generally, greater production and less splitting of calyces but poorer quality flowers resulted from a night temperature of 60° F. than from one of 50° F. At 40° F. night temperature, production decreased and splitting increased. The number of petals in a flower with a split calyx was usually greater than in a normal flower, indicating that splitting may be due to mechanical pressure inside the calyx cup.

J.S.

634. MOREAU, M.

La fusariose de l'oeillet dans la région parisienne. (*Fusarium wilt of carnations in the Paris district.*)

Rev. hort. Paris, 1953, **125**: 930-2, illus.

Measures recommended for the control of this disease, which the author believes to be due more to *Fusarium roseum* than to *F. dianthi* in the Paris district, are: (1) disinfection of cuttings by a 15-minute dip in 0.5% glycol ester of dichlorocresol; (2) spraying diseased crops with this solution every 3 weeks (this also gives some control of carnation rust, *Uromyces caryophyllinus*); (3) painting wounds with disinfectant; (4) fungicidal spraying in the glasshouse between crops; and (5) pot disinfection with hypochlorite.

635. BARTHELET, J.

Le mildiou de l'oeillet. *Peronospora dianthicola* sp. nov. (*Carnation mildew. Peronospora dianthicola* sp. nov.)

Ann. Epiphyt., 1953, **4**: 173-83, bibl. 4, illus.

Carnation mildew (*Peronospora dianthicola* sp. nov.) is a serious disease in the south of France. Successful control is obtained with copper fungicides with added sticker. Notes are given on varietal resistance in perpetual giant double carnations.—Stat. Bot. Phytopath., Antibes.

636. WILLIAMSON, C. E.

Methyl bromide injury to some ornamental plants.

From abstr. in *Phytopathology*, 1953, **43**: 489.

Notes are given on a serious methyl bromide injury to carnations which was found to be proportional to the clay and organic matter contents of the soil.

637. BOWLES, E. J.

Rooting bed test.

Calif. Agric., 1953, **7** (10): 14.

The application of CRD-186 (krilium) to a clay-loam nursery bed promoted better root growth in chrysanthemums and greatly facilitated digging for transplanting to flowering beds.

638. KOFRANEK, A. M., LUNT, O. R., AND HART, S. A.

Tolerance of *Chrysanthemum morifolium* variety Kramer to saline conditions.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 528-32, bibl. 11.

Chrysanthemums of the Kramer variety are relatively tolerant to saline conditions when grown in sandy soil. Plant growth is satisfactory at an ECe of 6 millimhos per cm. Stem length is reduced about 1.7 inches per unit increase in ECe, but dry weight is not affected up

to an ECe of 6 if specific ion effects are not present. When salinity conditions are caused by an excess of NH₄ or Mg salts, stem length is greatly reduced. High levels of ammonia also greatly reduce the production of dry matter. The keeping quality of the blooms was adversely affected when all major nutrients were increased to high levels. [Authors' summary.]—Univ. Calif.

639. OKADA, M.

On the relation of stem length and leaf area to flower bud formation in chrysanthemums. [Japanese.]

J. hort. Ass. Japan, 1952, **21**: 174-8, bibl. 8.

It is known that when chrysanthemums are grown in shade culture the height of plant at the time when short-day treatment starts bears a close relationship to flower formation, and the plants, when they are small at the beginning of short-day treatment, are very late in flowering. The results of experiments conducted in 1950 with the early variety Ginteki, the mid-season variety Honen, and the late variety Shanozakura showed that the plants should first have been grown to a height of at least 18-20 cm. with Ginteki, 22-24 cm. with Honen, and 18 cm. with Shanozakura at the time when short-day treatment starts. In an experiment in 1952 it was shown that reduction of leaf area by removing 1 to 7 leaves per plant retards flower formation in shade culture, but its effects were far less severe than those due to smallness of plants at the beginning of short-day treatment. It may be said, therefore, that the retardation of flowering in small plants subjected to short days is not due to their small leaf area. Y.A.

640. CATHEY, H. M.

Age has no effect on chrysanthemum budding.

Bull. N.Y. St. Flower Grs, 1953, No. 98, pp. 2-3.

Different ages of vegetating stem were produced in 3 varieties of pompon chrysanthemum by allowing periods of 0, 2, 4 or 6 weeks to elapse between the date of pinching and the date on which short-day treatment was started. The experiment was repeated under normal light intensities at 3 different seasons of the year. Night temperatures were kept at a minimum of 60° F. The different ages of vegetating stem had no effect on the time taken to flower after short days were started with either single stem or pinched plants. Somewhat irregular and delayed flowering in one of the three seasonal groups of plants (flowering in May) is attributed to growing the stock plants at a lower temperature of 50° F. compared with 60° F., even though the cuttings and plants were subsequently grown at a minimum of 60° F.

641. DOORENBOS, J., AND KOFRANEK, A. M.

Inflorescence initiation and development in an early and late chrysanthemum variety.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 555-8, bibl. 4, illus.

It appeared that initiation of the capitulum and subsequent initiation of florets took place at the same rate in both an early and a late variety grown under identical short-day conditions. The main cause of the difference in flowering time, therefore, appears to be the period necessary for their subsequent development.—Univ. Calif.

642. OKADA, M.

Effects of day length and temperature on flowering of summer- and August-flowering chrysanthemums. [Japanese.]

J. hort. Ass. Japan, 1953, 21: 251-5, bibl. 5.

The results of experiments with summer-flowering chrysanthemums, which flower in June, and August-flowering chrysanthemums, which bloom from the end of July to the middle of September in the Tokyo district showed that both of them are able to differentiate flower buds and bloom normally, though slightly late, in long days, but, whereas summer-flowering varieties differentiate flower buds when the temperature rises above about 8° C., August-flowering varieties need temperatures exceeding 12° to 15° C. for flower bud formation. The conclusion is reached that although these two kinds of chrysanthemum are both day-neutral, they differ in flowering season owing to different temperature requirements for flower bud formation. Y.A.

643. FURUTA, T., AND NELSON, K. S.

The effect of high night temperature on development of chrysanthemum flower buds. *Proc. Amer. Soc. hort. Sci.*, 1953, 61: 548-50, illus.

Experiments indicate that high night temperatures delay flower bud development in the chrysanthemum variety Sea Gull. To avoid excessive heating of the air when shading to produce short photoperiods, it is suggested that black cloth be used. J.S.

644. WATSON, D. P., AND ANDREWS, P. S.

The effect of light intensity on the flowering of chrysanthemum variety Gold Coast. *Proc. Amer. Soc. hort. Sci.*, 1953, 61: 551-4, bibl. 5, illus., being *J. Art. Mich. agric. Exp. Stat.* 1401.

Under a light intensity total of 1,848,797 ft. candles (equivalent to normal daylight) with temperatures of 51° F. by night and 61° F. by day and of 61° F. by night and 74° F. by day, 100% of the plants initiated flower buds in 11 and 10 short days respectively. Under a light intensity of 270,000 ft. candles with temperatures of 60° F. by night and 70° F. by day, 99% of the plants had initiated flower buds after 27 short days, but no initiation occurred under this lower light intensity when temperatures were 50° F. by night and 58° F. by day.

645. BEACH, R. G., AND LEOPOLD, A. C.

The use of maleic hydrazide to break apical dominance of *Chrysanthemum morifolium*. *Proc. Amer. Soc. hort. Sci.*, 1953, 61: 543-7, bibl. 9, illus., being *J. Pap. Purdue agric. Exp. Stat.* 630.

A spray containing 1,000 p.p.m. maleic hydrazide resulted in pot plants as good as, or better than, those produced by pinching. Varietal responses of the 3 varieties tested were similar. Flower quality was not inferior to that of the pinched plants. J.S.

646. HOWLES, R.

Virus diseases; chrysanthemum mosaic. *A.R. Cheshunt exp. Res. Stat.* 1952, 1953, pp. 33-4.

Of 4 methods of mechanical transmission tested, only one, involving the weakening of plants by heat treatment, gave successful transmission of the virus.

647. BURKHOLDER, W. H., MCFADDEN, L. A., AND DIMOCK, A. W.

A bacterial blight of chrysanthemums.

Phytopathology, 1953, 43: 522-6, bibl. 4, illus.

Notes are given on a hitherto unreported bacterial blight of glasshouse chrysanthemums recorded in widely scattered parts of the United States. The pathogen is an *Erwinia* for which the specific name *chrysanthemi* is proposed.—Cornell Univ.

648. HIRSCHMANN, H.

Control of leaf nematodes with "systox". *Höfchenbriefe* (English edition), 1953, 6: 90-113, bibl. 16.

The action of systox and parathion on *Aphelenchoides fragariae*, *A. ritzei* and *Ditylenchus dipsaci* was studied *in vitro*. As a result four to six applications of systox (0.05-0.1%) at intervals of 3-4 days are recommended for the control of leaf nematodes on ferns and chrysanthemums.

649. OLISEVIČ, G. P.

Control of phlox stem nematodes. [Russian.] *Sad i Ogorod*, 1953, No. 9, pp. 63-4, illus.

In trials on the control of phlox stem nematode, *Ditylenchus* sp., 3 soil applications of 200-300 c.c. of 0.05% NIUIF-100 (thiophos) per plant gave very good results. Foliage treatments with similar and higher concentrations of the same material and applications of other materials, such as dichloroethane and formalin were found unsatisfactory.

650. LEWIS, D.

Seed storage.

A.R. John Innes hort. Instn 1952, 1953, pp. 14-15.

Mixed *Primula sinensis* seed sealed in carbon dioxide and allowed to age at room temperature remained reasonably viable for at least 7 years. The speed of germination has been found to increase significantly in seed aged in CO₂ probably due to an inactivation of germination inhibitors during the period of storage. When a comparison was made between some vegetable seeds stored for 4 years, unsealed, air sealed and CO₂ sealed, onion and parsnip showed clearly the favourable effects of sealing and onion seemed to benefit by sealing in CO₂ as compared with air sealing. The different methods of seed storage did not produce any significant differences in crop yields.

651. GOLDEN, A. M.

A root-knot nematode attacking the crown, petiole, and leaf of African violet. From abstr. in *Phytopathology*, 1953, 43: 406.

A root-knot nematode of the *Meloidogyne arenaria* group has recently been found to occur in the crown, petiole and leaf of *Saintpaulia ionantha* as well as in the root. The symptoms of the attack are described. Only uninfected plants should be used for propagation or, in the case of infected plants, uninfected leaves.

652. MYODO, H., AND OKUMURA, M.
Studies on flower-seed production. II.
Development and ripening of the seed of
scarlet sage (*Salvia splendens* Ker-Gawl).
[Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1953, 22: 123-8, bibl. 6,
illus.

Seven phases in the seed ripening process are recognized and described, and the weight and germinating rate at each is given; the figures for seed harvested 5 days after complete browning of the fruit are 4.33 g. per 1,000 and 88%. Ripening was more rapid in early than in late flowers (14 days after flower-opening at the end of August compared with 23 in mid-September) and was not completed in flowers opening in late September or later.

653. MISRO, B.
Association of change in phyllotaxy with the
occurrence of tricotyly in *Antirrhinum
majus* and *Zinnia peruviana*.
Curr. Sci., 1953, 22: 270-1, bibl. 1.

Tricotyledonous plants of both snapdragon and zinnia showed different phyllotaxy to that of normal plants. In both cases 90% or more of the pollen produced by the tricots was sterile and no seeds were set either by selfing or by reciprocal crossing with dicots.

Bulbs, tubers, etc.

(See also 43, 46, 50, 62, 65, 735 I, q, t, w.)

654. MINISTER OF AGRICULTURE, CANADA.
Irrigation aids in bulb production.
A.R. Canada Minist. Agric. 1952/53, 1953,
p. 91.

Irrigation applied over 3 years in Saanichton increased the number of grade one bulbs of iris by 37%, of tulips by 42%, of hyacinths by 60% and of daffodils by 207%. The average amounts of water applied each season were 4.3 in. for daffodils and iris, 3.3 in. for tulips and 3.0 in. for hyacinths. So far no appreciable difference in storage quality was found between irrigated and non-irrigated bulbs. Two to 4 irrigations of 1 in. of water each, depending on the crop, are recommended, but bulbs for early forcing should not be irrigated after June.

655. CROSSLEY, J. H.
Forcing bulbs under electric lights.
Mimeo. Domin. exp. Stat. Saanichton 143,
1953, pp. 6+4 plates.

Four years' experimental work at Saanichton have preceded this publication in which type of lighting, incandescent or fluorescent, illumination periods and forcing temperatures with particular reference to narcissi and tulips are discussed. Precooling for early and easier forcing is recommended. Soils, planting, rooting and bestowal on the bench are also considered and lists of easy forcers are given. Hints are also included to help the amateur who wants to force under electric light in the basement. [See also *H.A.*, 23: 4453.]

656. OKADA, M., AND YAMADA, T.
On flower bud differentiation and its develop-
ment in amaryllis (*Hippeastrum hybridum*).
[Japanese, with English summary 9 lines.]
J. hort. Ass. Japan, 1953, 22: 119-22,
bibl. 1, illus.

In amaryllis the growing point ordinarily changes into a flower bud after 4 leaves have been formed, a new growing point then starting from the base of the lowest leaf. 72% of the bulbs examined had 4 leaves between successive flower buds and the range was 1-11. Ten phases of flower bud development are recognized from the stage of the vegetative growing point to that of pistil formation. While a flower cluster primordium is developing to complete flowers the growing point usually differentiates 8 new leaves and 2 new flower buds.

657. LEWIS, C. A.
Further studies on the effects of photoperiod
and temperature on growth, flowering and
tuberization of tuberous-rooted begonias.
Proc. Amer. Soc. hort. Sci., 1953, 61: 559-68,
bibl. 11, illus.

The critical photoperiod for the camelliaflora types of *Begonia tuberhybrida* lies between 12 and 14 hours of light. For two varieties of multiflora, it was shown to be 12 hours. Under short photoperiods, the plants ceased growth. No separate photoperiodic responses were found for vegetative and flowering growth. Tubers were produced under short photoperiods and there were no tubers produced under long photoperiods. An increase in temperature increased growth under both long and short photoperiods. Temperatures below 60° F. tended to nullify the differences in growth due to long and short photoperiods. A temperature of 60° F. or higher favoured an increase in tuber weight.—Cornell Univ.

658. DESHPANDE, B. D.
Presence of velamen in the earth roots of
Crinum latifolium Linn.
Sci. and Cult., 1953, 19: 198-9, bibl. 3, illus.

Velamen cells found in the roots of *Crinum latifolium* are described. Their pattern of thickening resembles that previously observed in the roots of *Asparagus* spp.

659. MAATSCH, R., AND RÜNGER, W.
Einfluss des Vorquellens von Cyclamen-
samen auf die Keimung. (The effect on
germination of soaking cyclamen seed in
water.)
Gartenwelt, 1953, 53: 310-11.

Data are presented to show that the soaking of cyclamen seed in water does not hasten germination.—Techn. Hochschule, Hannover.

660. FALK, K.
Forsøk med bekjempelse av gråskimmel-
râte på cyclamen. (*Botrytis cinerea* con-
trol on cyclamen.)
Gartneryrket, 1953, 43: 616.

In small-scale trials at the Norwegian College of Agriculture fermate and brassicol gave better (50%) control of *Botrytis cinerea* on cyclamen than did several other fungicides.

661. NORDSTRÖM, C. G., AND SWAIN, T.
The flavonoid glycosides of *Dahlia varia-
bilis*. Part I. General introduction. Cyanidin,
apigenin, and luteolin glycosides from the
variety "Dandy".
J. chem. Soc. Lond., 1953, pp. 2764-73,
bibl. 26.

The sap-soluble pigments responsible for flower colour in *Dahlia variabilis* are reviewed. A method for identifi-

cation of flavones and their glycosides on a micro-scale is described. [From authors' summary.]—Low Temp. Res. Stat., Cambridge.

662. PAPE, H.

Eine häufige Blattfleckenkrankheit der Dahlie. (A common leaf spot disease of dahlia.) *Gartenwelt*, 1953, 53: 255-6, illus.

The symptoms caused by *Entyloma dahliae* are described and illustrated. The control measures recommended are of a cultural character coupled with copper sprays in summer. Two other leaf spots of dahlia, caused by *Phyllosticta dahliaecola* and *Aphelenchoides ritzema-bosi*, are also illustrated by photographs.

663. KOSUGI, K.

Studies on flower bud differentiation and development in the freesia. I. On the time of flower bud differentiation and process of flower bud development. [Japanese.] *J. hort. Ass. Japan*, 1953, 22: 61-3, bibl. 18, illus.

Flower bud development was observed in 1951-52 in *Freesia refracta* var. *alba* in outdoor cultivation and in plants undergoing forcing. (1) Corms were planted in a warm site outdoors on 6 October. In this case, initiation of the inflorescence occurred on 9 November and that of the flower bud occurred 9 days later. Stamens were initiated on 9 December, early stages of pollen and ovule formation were observed on 8 January, and flowering occurred from 17 April onwards. (2) Corms were forced in a cellar at 17° C. for 22 days, and then planted in boxes and grown out of doors. From 30 November they were placed in a heated glasshouse. In this case, initiation of the inflorescence and of flower buds occurred on 18 and 30 October respectively. Stamens were initiated on 19 November, pollen and ovules both on 9 December, and the date of first flowering was 18 January. Y.A.

664. IWAMA, S., AND IWAI, S.

On late season culture of gladiolus. [Japanese.] *J. hort. Ass. Japan*, 1952, 21: 183-8, bibl. 10.

Many experiments have been carried out on gladiolus, mostly with the plants grown from corms, though cormels are used in some cases in late season culture for cut flower production. In the present experiment with the varieties Stop-Light and Hector, relations of cormel size, temperature and day-length to flower formation were determined by using cormels of 3 different size grades planted at different times in two districts of low and high temperature. It was found that plant growth was markedly affected by temperature and the plants grown in the warmer district made better growth. Flower bud differentiation was not influenced by day-length and temperature, as when corms are used, and it occurred when the plants had grown for about 100 days and developed 2 or 3 leaves. The plants grown from larger cormels formed flower buds earlier than those grown from smaller cormels. Y.A.

665. FORSBERG, J. L.

Drying gladiolus corms. *Flor. Rev.*, 1952, 111 (2862): 33-4, 45, from abstr. in *Bull. N.Y. St. Flower Grs*, 1953, No. 98, p. 7.

A portable forage drier was successfully used to cure

gladiolus corms before storage. Few corms developed rot during storage when cured for 10 to 16 hours at temperatures of 95° to 105° F. The corms grew and flowered normally after storage. Attempts to cure the corms after packing by heating the warehouse were unsuccessful. Corms subjected to a temperature of 120° F. for 8 hours grew well after storage, but were weak or did not grow when heated for 16 and 24 hours. Growth and flowering were normal when corms were cured at 110° F. for 24 hours.

666. ROISTACHER, C. N., BALD, J. G., AND BAKER, K. F.

The tetrazolium test for dormancy and germinability of gladiolus cormels.

Science, 1953, 118: 186-7, bibl. 3.

The relatively simple method described has given reasonably accurate results in determining the germination ability of gladiolus cormels. The experiments which led to the development of the method will be described elsewhere.—Univ. Calif., Los Angeles.

667. NAKASONE, H. Y.

Methods of breaking the dormancy of gladiolus corms in Hawaii with special reference to the effects of ethylene chlorohydrin.

Circ. Hawaii agric. Exp. Stat. 41, 1953, pp. 10, bibl. 9.

Experimental results are presented showing the effectiveness of ethylene chlorohydrin in shortening the rest period of 3 varieties of gladioli. Corms treated with ethylene chlorohydrin required a longer period than those treated with cold to attain a desirable percentage of sprouting, but, when storage time was considered, the total time required for treatment and desirable degree of sprouting was about twice as long for the low temperature treated corms as for the chemically treated ones. Notes are given on flower stalk and flower production, time of flowering and on the methods of applying the chemical in solution or, preferably, in the simpler vapour form.

668. SIEV, D., AND HALEVY, Z.

Iron sulphate to control chlorosis of gladioli. [Hebrew.]

Hassadeh, 1953, 33: 318.

Chlorotic gladiolus plants grown in chalky soils in the Jordan Valley rapidly became green when sprayed with a 0.3-0.4% iron sulphate solution plus agral spreader and produced significantly more flowers than unsprayed plants. H.C.R.

669. MENDIOLA-ELA, V.

The *Curvularia* disease of gladiolus in the Philippines.

Philipp. Agric., 1952, 35: 517-33, bibl. 10, illus.

Curvularia spot (*C. lunata*) is a new disease of gladiolus in the Philippines. It is prevalent in warm weather in the wet season. Its symptoms are severe spotting of leaves, spikes, stipules and corms. Control measures include dry season planting, dipping healthy corms in 1% HgCl₂ solution for 2 hours or dusting them with fungicide, and fungicidal spraying or dusting of new growth during the rains.

670. MARSHALL, B. H., Jr.

Relation of wound periderm in gladiolus corms to penetration by *Fusarium oxysporum* f. *gladioli*.

Phytopathology, 1953, 43: 425-31, bibl. 10, illus.

Fusarium oxysporum f. *gladioli* failed to penetrate the corms of 2 susceptible gladiolus varieties inoculated after 5-7 days in conditions favourable for wound periderm formation (in a moist chamber at 95% R.H. and 95° F.) whereas considerable rotting occurred in corms inoculated after 1-4 days. Corms receiving pre-storage heat treatment with and without high R.H. were much less severely rotted than those treated with either Dow 9-B or spergon, though a high percentage of rot occurred in all treatments. Rapid mummification of the corms treated with fungicides suggests latent infections which became manifest when the corms were weakened by chemical injury. In all treatments the longer the corms were allowed to cure before cleaning (up to 30 days, the maximum of the experiment), the less severe was the rot. Bruised corms generally rotted more quickly than did unbruised, but the difference between the 2 groups was slight.—Dep. Plant Path., Univ. Maryland, College Park, Maryland.

671. GAGNOTTO, A.-V.

Osservazioni su *Fusarium oxysporum* Schl. var. *gladioli* Massey e prove di lotta contra di esso. (Notes on *Fusarium oxysporum* var. *gladioli* and control tests.) [English summary 8 lines.]

Ann. Sper. agrar., 1953, 7: 807-25, bibl. 21.

In field tests, spergon, phygon and N.I. cersan afforded protection to healthy corms but were not satisfactory for the treatment of diseased corms. H 11 B, an oxy-quinoline product, had a protective effect equal to that of phygon and slightly inferior to spergon and a definite curative effect, resulting in greater flower production. For storage treatment H 11 B and N.I. cersan were the best.—Staz. Pat. veg., Rome.

672. BALD, J. G., AND JEFFERSON, R. N.

Injury to gladiolus associated with the root mite, *Rhizoglyphus rhizophagus* Bks.
Plant Dis. Repr., 1952, 36: 435-7, bibl. 2, illus.

Evidence is discussed which suggests that the root mite, *Rhizoglyphus rhizophagus*, is a serious pest of gladiolus in southern California, partly because of its direct action on roots and corms and partly because of its association with rotting organisms. Investigations on control, which show promise, will be described elsewhere.

673. AMIN, F. Y., AND WATSON, D. P.

The influence of soil nutrients on the growth of *Hyacinthus orientalis*, Linn.
Proc. Amer. Soc. hort. Sci., 1953, 61: 533-7, bibl. 15, illus., being *J. Art. Mich. agric. Exp. Stat.* 1445.

The kind and amount of nutrients were found to influence the time required for flowering, the length of the flowering period and the quality of hyacinth plants grown in sand culture. The treatment that produced plants having the longest flowering period, the best quality of plants and yet produced relatively early

flowering was one containing 100 p.p.m. each of N, K and Ca; 50 p.p.m. of Mg, 20 p.p.m. of P and moderate levels of micro elements. All plants grown in a nutrient solution were of a greater uniformity in size than those grown in distilled water. The highest degree of uniformity occurred in plants grown in a low P concentration of 20 p.p.m. with moderate nutrient levels. [Authors' summary.]

674. STUART, N. W., AND GOULD, C. J.

Forcing tests with iris.

Flor. Rev., 1953, 112 (2903): 19-20, 27, from abstr. in *Bull. N.Y. St. Flower Grs.*, 1953, No. 98, p. 7.

Varieties of early iris other than Wedgewood were forced at night temperatures of 55° and 65° F. The average flowering date of bulbs forced at 65° F. was earlier than that of those forced at 55° F., but the percentage of saleable flowers was less. Bulb rot was considerably increased at 65° F., and the stem length and weight were reduced. The most promising varieties for early forcing were White Perfection, Moonlight, Gold Harvest, Gold Nuggett, and Pacific Gold. [See also *H.A.*, 23: 4446.]

675. HAASIS, F. A.

Soil fumigation with chlorobromopropene for control of *Sclerotium rolfsii* in Dutch iris.

Plant Dis. Repr., 1952, 36: 475-8.

Soil fumigation with chlorobromopropene at 15 gal./acre reduced the incidence of *Sclerotium rolfsii* on Imperator and Wedgewood irises, but under some conditions reduced the number of bulbs harvested owing to an increase in the incidence of basal rot caused by *Fusarium* sp. (probably *F. oxysporum*).

676. ROYAL HORTICULTURAL SOCIETY.

The lily year book, 1954, No. 17.

R.H.S., London, 1953, 9 × 5½ in., pp. 144, illus., 10s.+9d.postage, or U.S. \$1.65 post free.

This edition of the *Lily Year Book* contains 13 papers, various notes, and reports of three lily group meetings which contain a good deal of new and practical information. Among the articles special mention should perhaps be made of those by W. B. Turrill on Balkan species [see next abstract], by N. W. Stuart on the effects of storage temperatures on forcing Easter lily bulbs* and by E. K. Field on the comparison of lily bulbs, in which she illustrates and describes the bulbs of 18 species. Other articles include suggestions on lily gardens, notes on various lily hybrids and on lilies and fritillaries seen in Nepal.

677. TURRILL, W. B.

The lilies of the Balkan peninsula.

R.H.S. Lily Year Book 1954, 1953, No. 17, pp. 30-9.

Under Comber's classification the 5 species of *Lilium* found in the Balkans are grouped in 2 sections: 1. *Martagon*—*L. martagon*; 2. *Liriotypus*—*L. candidum*, *L. chalcidonicum*, *L. carniolicum* and *L. bulbiferum*. The variants and distribution of each of these species are discussed in some detail.

* Reprinted from *Rep. 13th int. hort. Congr.* (see *H.A.*, 23: 1036).

678. STUART, N. W.

Quick cooling of new-crop Easter lily bulbs permits same-year forcing for winter market.

Flor. Exch., 1953, **121** (11): 20-1, illus.

Experiments discussed in this report show that under Beltsville, Md. conditions it is possible to force new-crop, southern-grown Easter lily bulbs by November or December of the same year. For maximum acceleration in blooming, freshly harvested, mature bulbs should be stored for 5 or 6 weeks at 45° or 50° F. and then planted at once in order to take advantage of better light conditions in the greenhouse during autumn than during winter. It is important that the plants should be potted in moderately fertile soil or be supplied with fertilizer containing N and given ample water and an unshaded place in the greenhouse.

679. STUART, N. W.

Storage of lily bulbs.

Flor. Rev., 1953, **112** (2906): 22-3, 100-3, from abstr. in *Bull. N.Y. St. Flower Grs.*, 1953, No. 98, p. 7.

Progress in bulb storage methods improves Easter lily flowering.

Flor. Exch., 1953, **121** (5): 10-11, illus.

Loss of moisture from lily bulbs and the packing material was effectively prevented by lining the bulb cases with sheets of 150-, 200- and 300-gauge polyethylene plastic film. Georgia-type Easter lilies stored in polyethylene-lined cases were in excellent condition after 36 weeks and produced an average of 4.5 blooms per plant; but only 1.6 blooms were produced after storage in unlined cases. The plastic film was of greatest value with long storage at low temperatures (31° to 33° F.). Peat with a moisture content of 40% to 50% was much superior to peat with higher moisture contents as packing material for long storage periods. For early forcing the moisture content of the packing material and loss of water from the bulbs were critical factors.

680. DE BOER, S.

Bestrijding rot in leliebollen (*Lilium speciosum album*). (Control of bulb rot in *Lilium speciosum album*.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 9-10.

In tests with 6 chemicals, soil treatment with Aafuma (pentachloronitrobenzene) at 70 g./m.², and bulb treatment with Tripomol (TMTD) at 10 g./500 g. gave the best control of bulb rot and resulted in the most satisfactory growth.

681. ROYAL HORTICULTURAL SOCIETY.

The daffodil and tulip year book 1954, No. 19.

R.H.S., London, 1953, 9×5½ in., pp. 165, illus., 10s.+9d. postage, or U.S. \$1.65 post free.

The nineteenth edition of the Year Book contains some 29 articles among which particular mention might be made of "The genetics of narcissus. I. Sterility" by A. J. Bateman, "Common mistakes in growing daffodils" by C. B. Habershon, and "Daffodil literature" by C. F. Coleman. In addition there are articles on raising new daffodils, preparing daffodils for exhibition, and on the growing and showing of daffodils in Britain,

Australia, New Zealand and Southern Rhodesia (within the tropics at 5,500 ft). C. H. Curtis describes his fifty years with the R.H.S. Daffodil Committee. Tulips are represented by notes on new varieties seen in Holland and on the diversity of odours given off by various types.

682. DOUCETTE, C. F.

The narcissus bulb fly.

Flor. Rev., 1953, **111** (2876): 25-6, from abstr. in *Bull. N.Y. St. Flower Grs.*, 1953, No. 98, p. 7.

Complete control of the narcissus bulb fly was obtained by soaking bulbs in a 25% solution of heptachlor (½ or 1 lb. per 64 gal. of water) for 10 min. prior to planting. Both aldrin and chlordane were also effective in commercial trials. Injury to the bulbs occurred with dieldrin and lindane.

683. JENSEN, H. J.

Observations on the root lesion nematode disease of narcissus and progress of control.

Plant Dis. Rept., 1953, **37**: 39-40, bibl. 2.

Several varieties of narcissus have proved susceptible to attack by a root-lesion nematode, *Pratylenchus* sp., in Oregon. Infection results in undersized bulbs. Investigations suggest that infection is not spread to new areas in bulbs harvested from infected fields. Soil fumigation by DD and EDB shows promise, but improvements are needed in machinery for, or methods of, application.

684. AMICO, A.

"Estivazione" di *Sternbergia lutea* (Forcing *Sternbergia lutea*.) [English summary 8 lines.]

Nuovo G. bot. ital., 1951, **58**: 596-8, bibl. 1.

Experiments at Bari University showed that *Sternbergia lutea* bulbs can be made to flower in June-July (instead of September) by placing them in an oven at a uniform temperature of 30°-39° C. for 4 weeks. 40° C. kills them. A period of dormancy is necessary between lifting the bulbs and subjecting them to heat treatment; in this experiment 3 weeks were allowed.

685. BENSÀ, S.

Coltivazione della *Strelitzia reginae* Banks nella Riviera di Ponente. (The cultivation of *Strelitzia reginae* in the western [Italian] Riviera.) [English summary 13 lines.]

Suppl. to *Ann. Sper. agrar.*, 1953, **7** (4), pp. xxi, illus.

This informative paper on *Strelitzia reginae* gives notes on its botany, propagation by seed and division, glasshouse cultivation, diseases and pests and their control, and the expansion of its commercial cultivation for cut flowers.—Staz. sper. Floric. Orazio Raimondo, Sanremo.

Lawns.

(See also 735u.)

686. MORRISON, K. J., AND OTHERS.

Lawns.

Ext. Bull. Wash. St. agric. Ext. Serv. **482**, 1953, pp. 15, illus.

Notes are given on preparing the area, grass varieties to choose from, seeding and care of the lawn, fertilizing established lawns, renovating old lawns, and weed, pest and disease control.

687. RICHARDSON, B. H.
Insecticidal control of Rhodes grass scale on St. Augustine grass lawns.
J. econ. Ent., 1953, 46: 426-30, bibl. 2.

Results of experiments described indicate that 1% parathion dust at 50 lb. per acre or parathion spray containing 0.25 lb. of actual toxicant in 200 gal. per acre applied at intervals of 7 to 10 days should give control of crawler and young established adults of the Rhodes grass scale, *Antonina graminis*, on St. Augustine grass lawns in the Winter Garden area of Texas. [From author's summary.]

Orchids.

(See also 735g.)

688. SALISBURY, SIR E.
Orchids.
Proc. roy. Instn G.B., 1953, 35: 293-8.

The geographical distribution of individual orchids shows a marked tendency to be greatest in the tropics and sub-tropics, though a few orchids are sub-tropic or alpine. The terrestrial orchid is a striking feature of temperate regions with a marked alternation between wet and dry seasons such as that of the Mediterranean. The author discusses many of the salient features of this prolific group. They are plants characteristic of an organically rich medium. If terrestrial they are more commonly found where the soil is rich in humus, if epiphytic their immediate environment is the organic debris that collects around their roots. The equilibrium maintained in respect of certain fungi is noted as being generally mycorrhizal in character. Notable characteristics of particular orchids are described.

689. SAKHARAM RAO, J.
Role of velamen tissue in roots of orchids.
Sci. and Cult., 1953, 19: 97-9, bibl. 2, illus.

No histological differences were found between the aerial roots of the epiphytic orchid *Vanda tessellata* and the soil roots of two terrestrial orchids, *Spathoglottis plicata* and *Phaius wallichii*. The velamen was present in both cases. In the epiphytic roots root hairs, though normally absent, were present under some conditions.

690. MURAKISHI, H. H.
Some observations on effect of chemotherapeutants and fungicides on *Vanda* orchid seedlings.
Bull. Pacif. Orchid Soc. Hawaii, 1953, 11: 1: 7-10, illus., from abstr. in *Rev. appl. Mycol.*, 1953, 32: 432.

In tests at the Hawaii Agricultural Experiment Station arasan (1:2,000), alone of all the chemotherapeutants used, gave good control of root rot (*Fusarium* sp.) in *Vanda* seedlings without causing any root injury. Pots containing 40 to 50 seedlings were immersed in the chemical bath for 20 to 30 minutes, the treatment being repeated two or three times at three-weekly intervals.

Succulents.

(See also 735e.)

691. HARDER, R., AND GÜMMER, G.
Über rhythmische Nachwirkung der photoperiodischen Induktion bei *Kalanchoë blossfeldiana*. (On the rhythmical after-effect of photoperiodic induction in *Kalanchoë blossfeldiana*.)
Biol. Zbl., 1953, 72: 386-93, bibl. 3.

In *Kalanchoë blossfeldiana* the capacity to form flowers under long photoperiods, after short-day treatment, gradually declines when the plants are kept under long photoperiods. The weaker the flowering impulse, the quicker is the rate of this decline. If the flowering impulse is sufficiently strong, the plants will flower repeatedly, even under long photoperiods. The second flowering period does not begin until the first blossoming is completely over, even if the plants are kept under short photoperiods. Flowering is a rhythmical phenomenon which can be induced at any season. From preliminary observations it appears that this rhythm is not due to changes in plasmatic activity but to certain metabolic processes which are controlled by the progress of flowering. [Translation of authors' summary.]—*Pflanzenphysiol. Inst. Göttingen*.

692. HARDER, R.
Über den Einfluss der Tageslänge nach der photoperiodischen Induktion auf die Infloreszenzen von *Kalanchoë blossfeldiana*. (On the effect of day length on the inflorescence of *Kalanchoë blossfeldiana* after photoperiodic induction.)
Planta, 1953, 42: 19-29, bibl. 7, illus.

A flowering impulse, in the shape of a 9-hour day, was applied for periods of 2, 8 and 16 days and the development of inflorescences was observed during subsequent treatments of 12-, 18- and 24-hour days. It was found that flowering performance was strongly influenced by the photoperiod applied during the phase in which the inflorescences develop. There was no statistically significant difference between the 18- and 24-hour days, both having a markedly delaying effect by comparison with the 12-hour day. The favourable influence of the 12-hour treatment is explained by the fact that this period of illumination still had some flower-promoting short-day action on *Kalanchoë blossfeldiana* [Translation of author's summary.]—*Göttingen Univ.*

Aquatic plants.

693. IRVINE, F. R., AND TRICKETT, R. S.
Waterlilies as food.
Kew Bull., 1953, No. 3, pp. 363-70, bibl. 30.

In this account based on the literature the authors discuss (1) the food utilization of rhizomes and tubers in *Nymphaea lotus* and 5 other *Nymphaea* species and in 3 species of *Nelumbo*, (2) that of the leaves and flower peduncles in *Nymphaea* and (3) that of the fruits and seeds in many *Nymphaea* and *Nelumbo* species.

Roses.

(See also 1027, 1041.)

694. MAMELI-CALVINO, E.
Le rose ibride italiane. (Italian hybrid roses.)
Ital. agric., 1953, 90: 656-9, bibl. 9.

A short history of rose breeding in Italy with special reference to the part played by the Stazione Sperimentale di Floricoltura at San Remo. Of special interest are the 1946 hybrids, Radar, Rabesco and Lawrence Johnston, and the earlier Cesarina, Micaela, Ricardo di Armando and Velluto.

695. CARRIER, L. E.

Environment and rose hardiness.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 573-80, bibl. 3.

The effects of defoliation, stem pruning, soil moisture, root pruning and soil nitrogen level upon the frost resistance of garden rose plants were investigated. Under the conditions of these experiments environmental conditions that significantly decreased hardiness of rose plants were complete defoliation, day-length of 18 hours and high soil nitrogen levels. Reduction of soil moisture levels, root pruning, 12-hour day-length and stem pruning had no effect on the hardiness of the rose canes. None of the environmental conditions studied altered the hardiness of roots of the rose understock. [From author's summary.]—Cornell Univ.

696. "DE PROEFTUIN" TE BOSKOOP.

Bemestingsproef met rozen. (Manurial trial with roses.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 17-18.

The effects of stable manure, N and K were studied on vigour and quality of polyantha roses grafted on *Rosa rugosa* stock. Stable manure had a favourable effect on the weight of wood produced and on the percentage survival after transplanting. A combination of high N and high K gave the best quality bushes. High K also increased the percentage survival.

697. ASEN, S., AND TUKEY, H. B.

Leaf scorch on the Snow White variety of greenhouse rose as influenced by various concentrations of boron and calcium.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 515-22, bibl. 14, illus., being *J. Art. Mich. agric. Exp. Stat.* 1393.

Leaf scorch in the Snow White variety of rose was effectively controlled when high calcium and medium high boron concentrations were available to the plants. High calcium and low boron concentrations as well as medium high boron and low calcium concentrations available to the plants, did not effectively reduce leaf scorch. The data support the hypothesis that boron aids more efficient utilization of calcium in plant metabolism, especially with reference to cell wall processes. [Authors' summary.]

698. BRIERLEY, P.

Study describes symptoms, control of rose streak.

Amer. Nurserym., 1953, **98** (8): 9, 77-9, bibl. 3, illus.

Rose rootstocks and varieties susceptible to streak disease are listed and leaf and cane symptoms are described and illustrated. The disease has been transmitted only by budding and grafting; no evidence of sap or seed transmission was obtained, and no insect carrier of the virus was found.

699. N.S.W. DEPARTMENT OF AGRICULTURE.

Rose wilt virus.

Agric. Gaz. N.S.W., 1953, **64**: 487-9, illus.

The symptoms and control (by destroying infected plants and possible insect vectors) of rose wilt virus are described. After a virtual absence of 30 years the disease recently occurred in near-epidemic form in the Sydney area. Many hybrid teas and pernettianas are susceptible, whereas floribundas as a class are very resistant.

700. LYLE, E. W.

Crown gall control progress noted in summary of Texas Rose Research.

7th A.R. Tex. Rose Res. Found. Inc., 1952/53, reprinted in *Flor. Exch.*, 1953, **120** (22): 13.

In addition to a brief report on methods of control and studies on crown gall and hairy root diseases of roses, notes are given on black spot diseases, nematode and virus diseases, storage of budwood, fertilizer trials, defoliation, weed control, insecticides and miscellaneous experiments.

701. SMITH, F. F., BRIERLEY, P., AND JENKINS, W. R.

Experiments with fungicide-insecticide dust mixtures on outdoor roses.

From abstr. in *Phytopathology*, 1953, **43**: 406.

Thirty mixtures were employed in a replicated trial, 5% DDT and 1% lindane being included in all cases. Of the fungicide dusts applied without an acaricide manzate was best, captan or ferbam-sulphur were slightly inferior, and sulphur with or without copper oxysulphate was poorest. Flower production was increased in some cases and reduced in others by the addition of an acaricide. All fungicides controlled black spot but none mildew.

702. MASTALERZ, J. W.

The effect of water absorption before low-temperature dry-storage on the development of blue color in Better Times roses.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 593-8, bibl. 8.

In low-temperature dry-storage, Better Times roses that absorbed water for 3 to 24 hours before storage developed a blue colour in 13 to 16 days. This colour change did not occur during the summer months. The use of sucrose solutions indicated that water was responsible for the colour change, but how the effect was produced was not determined. A limited supply of oxygen was effective in causing the development of a deep blue to purple colour. The practical application is that Better Times roses should be packaged directly after cutting for dry storage. [From author's summary. See also *H.A.*, 23: 2112.]—Cornell Univ.

Other trees and shrubs.

(See also 735d, h, i, j, k, n, y, 1026, 1027, 1042, 1048.)

703. BROERTJES, C.

Zaadonderzoek. (Seed investigations.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 31-2.

A progress report is given on treatments that will give the best germination of fresh and stored seed of

Cotoneaster bullata, *Ilex aquifolium* and stored seed of *Taxus baccata*. With the first 2 species the best time to harvest was found to be when the berries were light red, peat was the best stratification medium, and a better germination was obtained when the seed coats were removed. Cold water treatment at $\pm 3^{\circ}\text{C}$. and sulphuric acid treatment were both beneficial with *Cotoneaster* seed. For *Taxus baccata* the best treatment was found to be soaking the seed for 1-2 weeks in cold water at $1^{\circ}\text{--}3^{\circ}\text{C}$.

704. TEUSCHER, H.

Using plastic in outdoor grafting of conifers.

Amer. Nurserym., 1953, 98 (8): 13, 81, illus.

Pots, containing conifer rootstocks, are wrapped in wet sphagnum moss and polyethylene plastic, and are placed on temporary scaffolds around the mother plant up to any desired height, thus bringing the stock within easy reach of the upper, most suitable branches, which can then be used for approach grafting. The best time for grafting is when the tip buds of the branches are just beginning to burst. Four weeks later the union is complete and the scion can be severed from the mother plant. The pots, after removal of the wrapping, are sunk in the cold frame soil; a few days later the tips of the stocks are cut off immediately above the union, and the grafts are then mulched with sawdust or wood chips.

705. WELLS, J. S.

More about outdoor propagation under mist.

Amer. Nurserym., 1953, 98 (3): 17, 63-4, illus.

The system described earlier [see *H.A.*, 23: 4473] shows particular promise for softwood summer cuttings of deciduous flowering shrubs.

706. DORSMAN, C.

De invloed van de zuurgraad (pH) van de grond op de ontwikkeling van verschillende gewassen. (The influence of soil pH on the development of various plants.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 14-17.

In Boskoop soil the best pH for certain ornamental shrubs was found to be as follows: *Ribes alpinum* (winter cuttings), 5.4-5.9; *Tamarix pentandra* (winter cuttings), 5.4-5.9; *Berberis stenophylla* (winter cuttings), 5.0-5.6; *Philadelphus virginal* (winter cuttings), 5.4-5.9; *Daphne mezereum*, 5.9; *Magnolia soulangeana*, 4.4; *Thuja occidentalis*, 5.0-5.4.

707. MOLOTKOVSKIĬ, G. H., AND MOLOTKOVSKIĬ, JU. G.

A new method of breaking dormancy in woody plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1953, 90: 101-4, bibl. 5, illus.

In the experiment described 2-year-old seedlings of *Quercus robur* and *Q. rubra*, and 1-year-old walnut seedlings, grown in pots, and cut branches of *Tilia cordata*, *Fagus sylvatica*, *Fraxinus excelsior*, *Liriodendron tulipifera*, lilac and others were used. When the seedlings were placed in an inverted position and the ends of the branches bent downwards and kept at $15^{\circ}\text{--}18^{\circ}\text{C}$., they emerged from dormancy earlier than plants and branches kept in a normal position at the same temperature. Time of emergence depended on the species and

date of disturbance in polarity; the later the date the smaller the difference between the treated plants and controls. Inverted seedlings with ringed stems, however, emerged from dormancy even later than the controls, suggesting that a disruption in the flow of certain organic compounds from the roots was affecting dormancy. Ringing of branches had no such effect—both ringed and unringed bent shoots emerged from dormancy about the same time.

708. WALLACE, A., AND OTHERS.

Chlorosis in ornamentals.

Calif. Agric., 1953, 7 (10): 13-14, illus.

Chlorotic trees and shrubs of many species growing in calcareous soils in California have responded to soil applications of the chelated iron compounds ethylenediaminetetraacetic acid (EDTA), and more especially diethylenetriaminepentaacetic acid (DTPA), N-hydroxyethylethylenediaminetriacetic acid (HEEDTA) and an unknown compound. Tentative application rates are suggested in relation to plant height. It would appear that evergreens can be treated successfully at any time of year but most deciduous plants should probably be treated early in the growing season.

709. BOSCH, H.

Begassingsproeven met blauwzuurgas. (Trials on the treatment of shrubs with HCN gas.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 36-49.

The effects of treating woody plants with HCN prior to export was studied. About 200 species of ornamental shrubs and trees and some fruit trees and rootstocks were treated in late March and early April. The subsequent growth of treated and control plants is compared in tables. In general the fumigation retarded growth. In smaller scale trials, treatment in November caused no damage.

710. HAMILTON, C. C.

New acaricides against mites attacking nursery plants.

J. econ. Ent., 1953, 46: 442-5, bibl. 1.

The mites discussed in this paper are: *Brevipalpus inornatus* attacking azaleas and the southern red mite, *Paratetranychus ilicis* and the two-spotted spider mite [*Tetranychus bimaculatus*] attacking species of *Ilex*, *Juniperus*, *Thuja* and *Buxus*. The acaricides ovotran, aramite, geigy 338, dimite, chemite and EPN-300 applied by hydraulic sprayer or by mist blower usually gave good control of the mites for 5 or 6 weeks and appeared more suitable for spider mite control in the nursery than TEPP or parathion. [See also *H.A.*, 23: 3371.]

711. WELLS, J. S.

Pointers on propagation. Rooting *Acer palmatum*.

Amer. Nurserym., 1953, 98 (7): 15, 59-65, illus.

Soft tip cuttings of *Acer palmatum atropurpureum* taken in early summer, wounded and treated with hormone powder containing 2% indolebutyric acid, inserted in 90-95% peat and 5-10% coarse sand and kept under constant humidity at 70°F . day temperature are reported to have rooted very well.

712. YEATES, J. S.

The propagation of *Camellia reticulata*.
R.H.S. Rhododendron and Camellia Year
Book 1954, 1953, No. 8, pp. 99-103, illus.

Although *C. reticulata* can be raised from cuttings, approach-grafts or side-grafts, much better results have been obtained over 5 years by simple cleft-grafting. Among various stocks tried the best results have been obtained with *C. japonica* var. Great Eastern (Emperor) raised from cuttings. The stock, grown in pots, is cut back hard the previous winter. Grafting is done in mid-summer when the current season's wood of both stock and scion is half-ripe. Three to four leaves are left intact at the tip of the scions. High humidity and shading during sunny weather are maintained in the propagating house for 9 weeks after grafting, by which time the flower buds of successful grafts show renewed swelling.—Massey agric. Coll., Palmerston North, N.Z.

713. KOSUGI, K.

Studies on flower bud differentiation and development in some ornamental trees and shrubs. I. On the time of flower bud differentiation and process of flower bud development in *Camellia japonica* L. var. *hortensis* Makino and *C. sasanqua* Thunb. [Japanese.]
J. hort. Ass. Japan, 1953, 22: 50-4, bibl. 5, illus.

Flower bud development was studied in 1951 and 1952 in four varieties of *C. japonica* and one variety of *C. sasanqua* grown in the Tokyo district. The date of flower bud initiation was taken as that on which swelling of the crown of bud and sepal primordia was first observed. Flower bud initiation occurred from the middle of June to the beginning of July. Early varieties differentiated earlier than late varieties, but the difference was small. Development of the floral organs showed little difference in progress among early-, mid- and late-season varieties until ovule formation, but the difference became great during the stage of pollen formation. The variety Shiratama began to bloom on 8 October, Hakuho on 18 October, Wabisuke on 9 December, an unidentified red double variety on 28 March, and the variety of *C. sasanqua* on 10 November. Y.A.

714. BAXTER, L. W., AND PLAKIDAS, A. G.

Dieback and canker of camellias.
 From abstr. in *Phytopathology, 1953, 43: 466.*

The cause of dieback and canker of camellia, a widespread and often destructive disease in the southern U.S.A., is *Glomerella cingulata*, a wound parasite which ordinarily gains entry through leaf abscission scars.

715. VAN DIJK, P. J. S.

De bladvlekkenziekte van *Daphne mezereum*. (Leaf spot disease of *Daphne mezereum*.)
Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 7-9.

The vectors of this virus disease have not yet been found. Parathion sprays against possible vectors were ineffective and damaged the plants. Internal therapy with various chemicals also gave negative results. Completely covering the plants with gauze prevented virus infection but encouraged red spider and reduced

flowering the following year. Partial protection with gauze, the north side being left open, reduced the extent and severity of virus infection without any detrimental effects. Partial coverage from May to October is recommended.

716. DOORENBOS, J.

Oriënterend onderzoek over het forceren van *Forsythia* en *Rhododendron*. (The breaking of bud dormancy in *Forsythia* and *Rhododendron*. [English summary ½ p.]
Meded. Dir. Tuinb., 1953, 16: 533-43, bibl. 4, illus.

Bud dormancy is differentiated as follows: imposed dormancy, winter dormancy and summer dormancy. In the case of *Forsythia*, flower buds are formed in July and summer dormancy occurs in August. Experiments showed that flower buds could be induced to open in August by cutting or ringing the branches, thus interrupting the downward transport of synthesized food. Winter dormancy starts in September and is deepest at the time of leaf fall at the end of October. At this period cold treatment at 5° C. for 4 weeks was sufficient to break the dormancy. A warm water bath at 30° C. for 12 hours soon after the end of October was also sufficient to induce flowering. Continuous light treatment hastened flowering but its effect was less marked than that of the warm water treatment. *Rhododendron*, variety Cunningham's White, showed a striking response to continuous light treatment. From September onwards the flower buds on cut branches opened within a few weeks. Cold treatment had an unfavourable effect. Seedlings of *R. catawbiense album* were forced into new vegetative growth by additional light of low intensity during the night.

717. NYHOLM, I.

Spiringsundersøgelser af tjørn, *Crataegus monogyna* Jacq., af dansk og italiensk avl. (Studies on the germination of hawthorn seed from Denmark and Italy.) [English summary ½ p.]
Tidsskr. Planteavl, 1953, 56: 684-701, bibl. 7, illus.

Full data are presented on the stratification of *Crataegus monogyna* seed and its pre-treatment with concentrated sulphuric acid.

718. WELLS, J. S.

Pointers on propagation. Propagating *Ilex opaca*.
Amer. Nurserym., 1953, 98 (5): 12, 78-82, illus.

The procedure employed in the propagation of holly by cuttings is described in detail. The best type of cutting is made from tip growths of the current season, taken from the end of August till January or February. Methods of wounding the cuttings, hormone treatment, particularly with indolebutyric acid and 2,4,5-trichlorophenoxypropionic acid, rooting media, humidification and after-care of rooted cuttings are discussed in turn.

719. BRIERLEY, P., AND SMITH, F. F.

Tomato ringspot virus in the florists' hydrangea.
 From abstr. in *Phytopathology, 1953, 43: 404.*

Greenhouse *Hydrangea macrophylla* from 2 different

localities showing shoot die-back and rugose mosaic respectively both yielded tomato ringspot virus.

720. PROTSENKO, E. P., AND PROTSENKO, A. E.
Ring mosaic of lilac—an infectious disease.
[Russian.]
Bull. bot. Sada, 1950, No. 5, pp. 46-50,
illus., from abstr. *Rev. appl. Mycol.*, 1953,
32: 434.

Various types of speckle, ring mosaic, and leaf curl were observed on lilac leaves at the quarantine nursery, U.S.S.R. Academy of Sciences Central Botanical Garden, in 1948. Leaf curl was accompanied by yellow necrosis of the leaf edge and ultimately of the whole blade, extreme brittleness of the leaf, and abundant accumulation of starch. Ring mosaic was transmitted by grafting to 11 out of 15 shoots, thus confirming the infectious, virus nature of the disease. Speckle and leaf curl appeared to be independent of grafting.

721. DE BOER, S.
Bestrijding van schurft op sier-*Malus*.
(Control of scab on ornamental *Malus* spp.)
Jaarb. "De Proeftuin" te Boskoop, 1952,
pp. 12-14.

Experiments showed that spore infection by scab occurred on ornamental apple species at the same time as on fruiting species. Lists are given of the species which were heavily infected and those which were not attacked. In spraying trials, best control was obtained with 1 or 2 early copper sprays followed by 2 lime-sulphur sprays (1% and 0.75%).

722. WIDMER, R. E.
Nutrient studies with the poinsettia.
Proc. Amer. Soc. hort. Sci., 1953, 61: 508-14,
bibl. 7, illus., being *Pap. sci. J. Ser. Minn.*
agric. Exp. Stat. 2902.

In this study symptoms of nitrogen, phosphorus, potassium, calcium, magnesium and boron deficiency were produced in poinsettia plants of the varieties Mrs. Paul Ecke, Ruth Ecke and Albert Ecke. Sodium appeared to replace potassium to a limited extent when potassium was not supplied in the nutrient solution. Fluorine in excess of the amount contained in city water supplies did not affect the growth of poinsettia plants. [Author's summary.]

723. DE VRIES, J. T.
Diacetyl as a flower scent.
Nature, 1953, 172: 412, bibl. 1.

Diacetyl was shown to be present in the flowers of the tree *Polyalthia canangioides* var. *angustifolia* (Anonaceae), which exhales a heavy odour of fresh butter. This observation was made in the Botanic Garden at Bogor, Java.

724. DE VOGEL, P.
***Prunus* onderstammenproef. (*Prunus* rootstock trials.)**
Jaarb. "De Proeftuin" te Boskoop, 1952,
pp. 22-4.

Observations were made on the behaviour of 6 ornamental *Prunus* species on various rootstocks. The results are tabulated.

725. COX, R. S.
Control of pyracantha scab.
Plant Dis. Repr., 1953, 37: 7-10, bibl. 5,
being *Misc. Pap. Del. agric. Exp. Stat.* 157.

In tests over 3 years with several fungicides on the control of scab (*Fusicladium pirinum* var. *pyracanthae*) on *Pyracantha coccinea lalandi* the best control was given by Puratized Agricultural Spray (phenyl mercuri-triethanol ammonium lactate). Bordeaux mixture and tribasic copper sulphate were also fairly effective. There were indications that 3-4 applications of 1 pt. Puratized in 100 gal. water early in the summer exerted an eradicant effect on the fungus.

726. ROYAL HORTICULTURAL SOCIETY.
The rhododendron and camellia year book
1954, No. 8.
R.H.S., London, 1953, 9×5½ in., pp. 162,
illus., 10s.+9d. postage, or U.S. \$1.65 post
free.

The scope and form of this Year Book is similar to that of its predecessors except for the notable addition of the increasingly popular genus *Camellia*. Of an interesting selection of articles, five, dealing with the propagation of camellias and with the propagation, nutrition and culture of rhododendron, form the subject of separate abstracts. Others include an appreciation of the late Lord Aberconway, the collection of rhododendron species in Windsor Great Park, rhododendrons in western Nepal, some rhododendron anomalies, a review of rhododendrons in their series (the *Campylogynum* and *Saluenense* series), the natural hybridization of wild rhododendrons in the U.S.A., the search for a yellow camellia and details of the many varieties of *Camellia sasanqua* which has become very popular in the U.S.A.

727. RHODODENDRON GESELLSCHAFT, BREMEN.
Rhododendron und immergrüne Laubgehölze.
(Rhododendron and evergreen woody plants.
Yearbook 1953.)
Rhododendron Gesellschaft, Bremen, 1953,
pp. 87, illus.

The year book includes two reviews, (1) by K. v. Weihe on the application of growth substances in the propagation of rhododendrons by cuttings, pp. 22-7, bibl. 12, illus., with two pages of tables recording responses to treatments; and (2) by H. Hickmann on rhododendron breeding, pp. 33-58, illus. The latter paper is to be continued in the next year book.

728. NISEN, A.
Quelques aspects spéciaux de la culture de l'azalée. (Some particular aspects of azalea growing.)
Cour. hort., 1953, 15: 495-8, 539-41,
bibl. 21.

The author draws the following conclusions from a review of recent literature: (1) azaleas show no photo-periodic reaction; (2) high temperatures (18° C. minimum) are necessary for flower bud induction; (3) the limiting factor for vegetative growth in cuttings is temperature and in adult plants light; (4) mineral deficiencies, especially Fe, will cause chlorosis if the soil pH is not low (pH 4-6); (5) in propagation by cuttings an ample water supply is important and growth substances give good results.

729. PRESTON, W. H., Jr., SHANKS, J. B., AND CORNELL, P. W.

Influence of mineral nutrition on production, rooting and survival of cuttings of azaleas.
Proc. Amer. Soc. hort. Sci., 1953, 61: 499-507, bibl. 13, being *Sci. Pap. Md agric. Exp. Stat., Dep. Hort.*, A376.

Low, medium and high levels of N, P and K were supplied to azalea plants of 3 varieties grown in peat or sand from which cuttings were to be taken. Succulent cuttings from plants receiving the low level of N showed a greater degree of rooting than those from plants receiving the high level. With mature cuttings, those taken from plants receiving the high level of N showed the greatest degree of rooting. Survival of cuttings varied similarly. Varied levels of P and K had no important influence on production, rooting or survival of cuttings used in this study. With the plants grown in sand increases in levels of N increased N and P contents of the leaves; increases in levels of P increased P content; but varied levels of K did not affect N, P or K contents. J.S.

730. WOUDEBERG, J. P. M., AND RAVENBERG, K.

Verslag van het onderzoek naar de invloed van temperatuur en vochtigheid op de beworteling van stekken in kassen en bakken te Boskoop in 1952. (Report on the effect of temperature and humidity on the rooting of cuttings in a glasshouse and frame at Boskoop in 1952.)

Jaarb. "De Proeftuin" te Boskoop, 1952, pp. 49-53.

Cuttings of *Rhododendron catawbiense grandiflorum* were rooted in pots placed on peat beds in a frame and glasshouse. The percentage take was 29.2 in the glasshouse and 41.5 in the frame. In the glasshouse the best results were obtained at the sides of the beds, especially the side next to the outer wall. In the frame the differences were less marked, but the percentage take was better towards the back. In the frame the soil humidity was lower in the beds and higher in the pots than in the glasshouse. Both soil and air temperatures were higher in the glasshouse than in the frame. Further study is needed to explain the effects of these conditions on rooting.

731. WELLS, J. S.

Further notes on the propagation of rhododendrons from stem cuttings.

R.H.S. Rhododendron and Camellia Year Book 1954, 1953, No. 8, pp. 109-11.

Investigations reported in the last Year Book [see *H.A.*, 23: 2131] were continued. With cuttings of the comparatively shy-rooting Dr. Dresselhuys taken on 8 August, treatment with 2,4,5-trichlorophenoxy α -propionic acid (2,4,5-TP) resulted in 100% strong rooting by 12 January; other hormones were less effective. The time at which cuttings were taken proved very important; for example, of cuttings of E. S. Rand taken on 8 August, though treated with 2,4,5-TP, only 30% rooted, whereas 100% of those taken on 5 September rooted. Cutting leaves in half avoided matting in constant mist propagators and did not affect rooting adversely. In cases where a proportion of cuttings that had been wounded and treated with 2% indolebutyric

acid (IBA) in talc failed to root, re-wounding and re-treatment with 0.8% IBA resulted in rapid rooting of nearly 80%.

732. YEATES, J. S.

Polythene plastic as an aid in grafting evergreens.

R.H.S. Rhododendron and Camellia Year Book 1954, 1953, No. 8, pp. 104-6.

Rhododendrons have been successfully tip-grafted [see *H.A.*, 23: 2132] in positions in the open, sheltered from direct sunlight, by first wrapping damp sphagnum moss around the graft union and then enclosing the whole graft in a bag made by heat-sealing one end of a short length of 250 gauge tubular polythene. Grafting has usually been done in late summer but spring grafts have also succeeded. Thrips infestation on one occasion caused failure. The tubular form of polythene has also proved well adapted to air-layering and to enclosing cuttings set in pots.—Massey agric. Coll., Palmerston North, N.Z.

733. HANGER, F.

The cultivation of epiphytic rhododendrons.

R.H.S. Rhododendron and Camellia Year Book 1954, 1953, pp. 112-13, illus.

Several epiphytic and non-epiphytic species of *Rhododendron* have grown exceptionally well at Wisley when planted like orchids on platforms made of wooden slats, containing a compost consisting of equal parts of sphagnum moss, coarse peat and fibre from lime-free loam.

734. WELLS, J. S.

A new treatment for iron chlorosis.

R.H.S. Rhododendron and Camellia Year Book 1954, 1953, No. 8, pp. 107-8.

In a preliminary trial very chlorotic young azalea plants sprayed at the end of August with iron sequestrane (iron chelated with EDTA) at 4 lb. to 100 gal. water turned green and renewed growth within 5 weeks. Plants sprayed with iron sulphate also turned green but did not continue growing. Other chlorotic rhododendrons and azaleas sprayed at the end of September had all turned green by the spring.

Noted.

- 735.

a BAECKER, P.

Rassenproef van *Hydrangea hortensis*. (Hydrangea variety trials.)

Cult. Hand., 1953, 19: 460-1.

Brief notes on 32 new hydrangea varieties.

b BAKER, H. G.

Dimorphism and monomorphism in the Plumbaginaceae. II. Pollen and stigmata in the genus *Limonium*.

Ann. Bot. Lond., 1953, 17: 433-45, bibl. 17, illus.

c BOSLEY, D. A., AND BECK, G. E.

How to grow African violets.

Circ. Univ. Wis. Coll. Agric. Ext. Serv. 437, 1953, pp. 4, illus.

Saintpaulia ionantha.

- d BRIDGERS, B., AND CORNELL, P. W.
Stem-cutting propagation of rhododendrons.
Flor. Exch., 1953, **120** (21): 10-11, 15, bibl.
3, illus., being *Misc. Publ. Md agric. Exp.
Stat.* **160**.
For another account see *H.A.*, 23: 4481.
- e BÜNSOW, R.
Endogene Tagesrhythmik und Photoperio-
dismus bei *Kalanchoe blossfeldiana*. (The
endogenous daily rhythm and photoperiodism
in *Kalanchoe blossfeldiana*.)
Planta, 1953, **42**: 220-52, bibl. numerous.
- f ERNST, A.
Die Relation Antherenstellung Pollenkorn-
grösse bei Blütendimorphismus und das
Kompatibilitätsproblem. (The relation be-
tween anther position and pollen grain size
in dimorphous flowers and the problem of
compatibility.)
Planta, 1953, **42**: 81-128, bibl. numerous,
illus.
In *Primula* species and varieties.
- g DE FIGUEIREDO, E. R., JR., AND LEPAGE,
H. S.
Caracóis daninhos às orquídeas. (*Helix
similaris*, a pest of orchids.)
Biológico, 1953, **19**: 31-3, bibl. 4, illus.
And its control with metaldehyde.
- h GARDNER, C. A.
Trees of Western Australia. No. 20. The
red box or gum-barked Coolabah. (*Eucalyp-
tus intertexta* R. T. Baker.)
J. Agric. W. Aust., 1953, **2**: 501-3, illus.
An ornamental and shade tree.
- i GARDNER, C. A.
Trees of Western Australia. No. 21. Forrest's
Mallee. (*Eucalyptus forrestiana* Diels.)
J. Agric. W. Aust., 1953, **2**: 503-4, illus.
An ornamental tree.
- j HAUGE, A.
Alperoser i blomstring på 64,5° nordlig
bredde. (Alpine rhododendrons in flower at
64.5° northern latitude.)
Norsk Hagetid, 1953, **69**: 175.
- k LLOYD, C.
Shrubs in east Kent. Observations on doubt-
fully hardy species at Wye College.
J. roy. hort. Soc., 1953, **78**: 416-20.
- l MAGIE, R. O., SMITH, F. F., AND BRIERLEY,
P.
Occurrence of western aster yellows virus
infection in gladiolus in eastern United
States.
Plant Dis. Repr., 1952, **36**: 468-70, illus.
Including description of symptoms.
- m MEAHL, R. P., LITTLE, L. D., JR., AND
ATMORE, S.
1951 trials of annual flowers at the Pennsyl-
vania State College.
Progr. Rep. Pa agric. Exp. Stat. **98**, 1953,
pp. 66.
The performance of 844 samples of annuals.
- n MESSING, J. H. L.
The effects of some acute mineral deficiencies
on perpetual flowering carnations.
A.R. Cheshunt exp. Res. Stat. 1952, 1953,
pp. 71-4.
Symptoms of N, P, S, K, Mg, Ca, B, Mn,
Fe and Zn deficiencies.
- o MOREAU, M.
Les maladies de dépérissement des oeillets
dans la Région de Nice. (Carnation diseases
in the district of Nice.)
Rev. hort. Paris, 1953, **125**: 907-9, bibl. 1,
illus.
- p N.S.W. DEPARTMENT OF AGRICULTURE.
The cineraria leaf-miner.
Agric. Gaz. N.S.W., 1953, **64**: 383, illus.
Phytomyza atricornis and its control with
DDT or nicotine sulphate.
- q N.S.W. DEPARTMENT OF AGRICULTURE.
The gladiolus thrips.
Agric. Gaz. N.S.W., 1953, **64**: 439-40, illus.
Notes on *Taeniothrips simplex* and its con-
trol in N.S.W.
- r N.S.W. DEPARTMENT OF AGRICULTURE.
The leaf case moth.
Agric. Gaz. N.S.W., 1953, **64**: 500, illus.
Hyalarcta hubneri and its control with DDT
or lead arsenate.
- s PAISLEY, K.
Fertilisers for horticultural crops. 15.
Manures for chrysanthemums.
Fert. Feed. St. J., 1953, **39**: 681-5.
- t PAPE, H.
Viruskrankheiten bei Gladiolen. (Virus
diseases of gladiolus.)
Gartenwelt, 1953, **53**: 65-6, bibl. 9, illus.
- u SHURTLEFF, M. C.
Factors that influence *Rhizoctonia solani*
to incite turf brown patch.
From abstr. in *Phytopathology*, 1953, **43**:
484.
- v SRIVASTAVA, S. N. S.
On the occurrence of *Phoma chrysanthemi-
cola* Hollos on *Chrysanthemum* sp.
Curr. Sci., 1953, **22**: 216, bibl. 4.
- w STEFFEN, L., AND RENARD, —.
Die Entwicklung von Pflanzmaschinen für
Tulpen. (Planting machines for tulips.)
Gartenwelt, 1953, **53**: 323-7, illus.
Various models discussed and illustrated.
- x SUSINI, E.
L'Asystasia bella, Blume. (*Asystasia bella*.)
Riv. Ortoflorofruttic. ital., 1953, **37**: 218-20,
illus.
Botanical and cultural notes.
- y WILLIAMSON, J.
Observaciones sobre el cultivo de las
coníferas en la provincia Eva Perón. (Notes
on the cultivation of conifers in Eva Peron
province [Argentina].)
Rev. argent. Agron. B. Aires, 1953, **20**:
96-104.
Under semi-arid, temperate conditions.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Avocados.

(See also 10, 365, 777, 832g, o, v, w, x, y, z, 835, 837, 844.)

736. HALMA, F. F., AND FROLICH, E. F.
An approach to the evaluation of avocado rootstock variability.
Yearb. Calif. Avoc. Soc. for 1952, pp. 154-8, bibl. 2, illus.

A method by which a limited number of cuttings can be obtained from very young avocado seedlings is described. Such cuttings are not suitable for rootstocks but they do provide generally uniform material for studying growth variability of seedlings, for testing relative disease susceptibility and for procuring progeny of hybrid seedlings as an insurance against loss of the mother plant. Another method of producing cuttings, less limited in scope and already reported on [see H.A., 22: 4209], is briefly discussed.

737. BRINGHURST, R. S.
Sexual reproduction in the avocado.
Yearb. Calif. Avoc. Soc. for 1952, pp. 210-14, bibl. 10, illus.

Differences in time of maturity of the male and female elements of flowers (dichogamy) are discussed, including the double opening. The flowers are described as functionally monosexual, although they are structurally bisexual. The cyclic nature of the double opening is discussed and the correlation of temperature fluctuation with the erratic variation in the cycle of certain varieties is pointed out. Frequent overlap of first and second opening flowers probably minimizes the effect of these phenomena on fruit set. It is suggested that the cyclic dichogamy and variations with temperature could be important with certain varieties during prolonged periods of low temperature. These phenomena are very important in controlled pollination necessary for breeding work. [Author's summary.]

738. HAAS, A. R. C., AND BRUSCA, J. N.
Zutano avocado cuttings rooted.
Calif. Agric., 1953, 7 (10): 11-12, illus.

In contrast to experience reported for other avocado varieties twig cuttings of the Mexican variety Zutano, carrying 5-7 leaves cut in half, rooted readily without any special procedure or hormone treatment when set in a 50: 50 plaster-sand: peat mixture in a propagator. High humidity was maintained, and bottom heat kept the temperature of the medium to a minimum of 75° F.

739. ANON.
Avocado of the future.
Amer. Nurseryman, 1953, 98 (4): 52.

A Californian nurseryman has developed a method of growing avocado trees on 2 seedling rootstocks instead of one. He claims that this will double the chances of getting economically productive trees. The double-rooted trees will be tested in a controlled experiment at Sunny Valley Ranch, Puente, next year.

740. MOORE, P. W.
The fine art of fertilizing avocados.
Yearb. Calif. Avoc. Soc. for 1952, pp. 77-82.

Most of the information concerning the nutritional requirements of avocado has been obtained from

observations and experience rather than from carefully conducted experiments, hence avocado fertilization is considered more of an art than a science. A sound general fertilizer recommendation for California consists of an annual application of 100 to 200 lb. N per acre for mature trees and proportionately less for smaller trees. One half of the N should be supplied from manure and one half from chemical sources. Trees showing Zn deficiency symptoms should be sprayed with neutralized zinc sulphate or zinc oxide.

741. HAAS, A. R. C.
Importance of inorganic elements in the growth of avocado trees.
Yearb. Calif. Avoc. Soc. for 1952, pp. 187-95, bibl. 1, illus.

Topa Topa avocado seedlings grow better in soil than in pure silica sand, both cultures receiving Hoagland's nutrient solution, which in the case of sand culture only contained 5 minor elements: Al, B, Fe, Mn and Zn. When Cu was added to the list of minor elements supplied to the nutrient of the sand cultures, seedling growth was appreciably improved. In studying further inorganic elements to promote healthy growth of avocado trees, V and Ni appeared to offer promise. The vegetative growth of Topa Topa seedlings in solution cultures responded to variations in the concentration of the nutrient solution. Top growth was near a maximum when the culture solution used was 1½ times the strength of Hoagland's solution, whereas the root system approached a maximum in normal Hoagland's solution. Leaf size and colour intensity increased as the concentration of the nutrient solution was increased.

742. CAMERON, S. H., MUELLER, R. T., AND WALLACE, A.
Nutrient composition and seasonal losses of avocado trees.
Yearb. Calif. Avoc. Soc. for 1952, pp. 201-9, bibl. 6.

Data are reported for the dry weight and nutrient element content of a bearing, 7-year-old Mexican seedling avocado tree, for amounts of nutrients translocated from the leaves of Fuerte trees before abscission, and for the amounts of dry matter and nutrient elements lost in abscised leaves and blossoms by two 13-year-old Fuerte trees during a 2-year period. The data indicate that half or more of the N and P and substantial amounts of K, Mg and S are returned to the tree from the leaves prior to leaf abscission. Losses of dry matter and nutrient elements approximately equivalent to 25% of the dry weight of the tree, 40% of the N, P and K, 60% of the Ca, and 75% of the Mg may occur each year in the blossoms and leaves that are abscised by an avocado tree. The relationships between these translocations and losses and the number and nutrient composition of the blossoms and the effects on tree growth are discussed. [Authors' summary.]

743. HALMA, F. F., AND GOODALL, G. E.
Relative susceptibility of avocado rootstocks to chlorosis. II.
Yearb. Calif. Avoc. Soc. for 1952, pp. 172-6, bibl. 3, illus.

This report presents additional evidence [see also *H.A.*, 22: 4214] showing that avocado trees on Guatemalan rootstocks are more susceptible to chlorosis than trees on Mexican and West Indian rootstocks. Incidence of the disorder was probably due mainly to an excess of calcium and, in a few cases, to salinity. Variations observed in susceptibility to chlorosis among seedlings of a given variety are caused, it is suggested, by a genetic factor.

744. NORTH, C. P., AND WALLACE, A.
Lime-induced chlorosis in avocado and a possible method of control.
Yearb. Calif. Avoc. Soc. for 1952, pp. 177-86, bibl. 11, illus.

Seedlings of the Guatemalan avocado variety Edranol and the Mexican variety Topa Topa were grown in a glasshouse in soil limed with calcium carbamate. Within 10 months 78% of the Edranol and 30% of the Topa Topa plants became chlorotic. Since very young leaves of chlorotic plants were turned green with iron sprays and since the iron content of leaves, stems and roots of chlorotic plants was considerably reduced, the chlorosis was believed to be the result of iron deficiency. Manganese in all plants was greatly reduced by liming, but iron was reduced only in the chlorotic plants. Control of the chlorosis has been obtained by soil application of ethylene-diamine-tetraacetic acid (EDTA) containing iron, both in the glasshouse and in the field.

745. HAAS, A. R. C.
Sodium effect on avocado rootstocks.
Yearb. Calif. Avoc. Soc. for 1952, pp. 159-66, bibl. 5, illus.

The leaves of seedlings of different avocado varieties of the Mexican and Guatemalan races (eligible as rootstocks) grown in sand cultures reacted differently to the same concentration of Na in the nutrient solution. The root systems of certain seedlings vary greatly in their retention of absorbed Na. Severe leaf injury resulted when the root systems absorbed considerable quantities of Na and permitted much of it to pass into the leaves, as was the case with the 2 Mexican varieties, Mexicola and Harmon. Seedlings of the Guatemalan variety Anaheim grew well and without any apparent leaf injury when 20 p.p.m. sodium was used in the culture solution, very little of the absorbed sodium reaching the leaf tissues.

746. SCHROEDER, C. A.
Growth and development of the Fuerte avocado fruit.
Proc. Amer. Soc. hort. Sci., 1953, 61: 103-9, bibl. 13, illus.

Data concerning the development of cell size and cell number in the avocado fruit indicate that increase in fruit growth results from both cell division and increase in cell size during the early period of fruit development, but that cell division is the major factor concerned with increase in fruit size in the latter phase of fruit development. Cell division apparently continues throughout the time the fruit remains on the tree. [From author's summary.]

747. GOODALL, G. E., AND OTHERS.
Frost protection for avocados.
Citrus Leaves, 1953, 33 (10): 20-2, 24.

In this article the text is reproduced of a booklet issued

by the California Agricultural Extension Service under the title "Protecting avocados from frost".* Aspects discussed include types of injury to fruits and trees, factors affecting susceptibility including varietal susceptibility, methods of protection of mature orchards by heaters and by wind machines with estimated costs in both cases, the protection of young trees, and the care of frost-damaged trees.

748. HAAS, A. R. C.
Sun-blotch in avocado seedlings.
Yearb. Calif. Avoc. Soc. for 1952, pp. 167-71, bibl. 1, illus.

Trials are described which indicate that the virus is transmitted not only by grafting but also by seed. The danger of the symptoms disappearing during certain stages of seedling growth and thereby making the disease unrecognizable is pointed out.

749. WHITSELL, R.
Sun-blotch disease of avocados.
Yearb. Calif. Avoc. Soc. for 1952, pp. 217-40, bibl. 46, illus.

Sun-blotch, a virus disease affecting only the avocado, has been observed in Southern California for over 30 years. The economic importance of this disease is seen in the low yields produced by affected trees and the large percentage of low grade cull fruit they bear. The disease is transmitted artificially by budding and grafting, possibly by natural root grafting, through the seed or by some insect vector, though at present there is no definite indication of spread by the latter. Disease symptoms are described and varietal resistance is briefly discussed.

750. ZENTMYER, G. A.
Spread of avocado root rot fungus in nursery stock.
Yearb. Calif. Avoc. Soc. for 1952, p. 102.

To produce planting material free from root rot, *Phytophthora cinnamomi*, nurseries should not be planted on old avocado soils, on areas that tend to stay wet or are badly drained, or on areas adjacent to infected groves.

751. GUZMÁN, V. L.
El problema de los paltos en Chanchamayo.
(The avocado problem in Chanchamayo [Peru].)
Int. Cent. nac. Invest. Exp. agric. Lima 73, 1951, pp. 9, bibl. 9, illus.

Avocadoes in Chanchamayo have suffered for many years from a disease resulting in reduced yield and death. The symptoms are chlorosis, defoliation and dieback, sometimes accompanied by an excessive production of small inferior fruits. Investigations have now shown that the cause is *Phytophthora cinnamomi*. Recommended control measures are the application of 5-10 kg. guano and 10 kg. magnesium limestone per tree and the drainage of waterlogged areas.

752. FLESCHNER, C. A., AND RICKER, D. W.
Natural enemies of mites on avocados.
Calif. Citrogr., 1953, 38: 418-19.

Among more than 40 species predaceous on plant-feeding mites on avocado by far the most important are the predatory mites *Typhlodromus* spp. Where

* Not yet received.

plant-feeding mite populations are high the beetles *Stethorus picipes* and *Oligota oviformis* and cecidomyiid flies may be important. In undisturbed conditions it has been found that the typhlodromid mites generally maintain plant-feeding species at a perfect natural balance. This balance can be upset by the use of most of the newer acaricides, certain insecticides notably DDT, and by deposits of road and field dust. Where the injurious mite population in a grove becomes high, neighbouring groves to windward, previously in a satisfactory state of natural balance, may become infested.

Carobs.

(See also 832d, m.)

753. DVORI, A.

Grafting [budding] carob trees. [Hebrew.]

Hassadeh, 1953, 33: 757-8, illus.

In Israel, November is the most suitable time for the preparation of carob trees for budding. Young trees 1-2 years old, less than 2 cm. in diameter, are most suitable. On older trees with a well-developed framework young shoots are budded, 3-4 being chosen, 10 cm. apart and evenly spaced around the tree, and other branches are removed. Branches less than 5 cm. in diameter and with fresh green or greenish-brown coloured bark are the best. If no suitable branches are available, the framework is cut back to about 50-60 cm., half the tree being cut back in one year, and the remainder the following autumn. Branches suitable for budding should be available 1½ years after pruning. Budding is done from mid-April to mid-May. The carob is dioecious and at least 5% of the trees should be "male" budded. The normal shield bud is used with wood removed. Branch removal is necessary to induce bud break but should be done in stages and with caution.

H.C.R.

Citrus—general.

(See also 5, 83, 201e, r, 837, 839, 840, 1028, 1045, 1047.)

754. HOOS, S., AND BOLES, J. N.

Oranges and orange products; changing economic relationships.

Bull. Calif. agric. Exp. Stat. 731, 1953, pp. 67.

A short summary of the main conclusions in this bulletin was abstracted in *H.A.*, 23: 3407. An indication of the wide economic field covered may, however, be of interest. The authors deal with the subject under 3 main headings: (1) *Review of economic trends*. This includes data on production and acreages since 1920, both of which have risen steeply (especially in Florida which is now well ahead of California), yields, which have fluctuated markedly over the period, and the relationship between acreage, yield and production. Information is also provided on utilization, shipment both local and export, costs of cultivation and marketing and returns from both fresh and processed oranges. (2) *Demand characteristics of oranges and orange products*. Data are given on seasonal price variations, consumer demands and consumer uses. (3) *Changing economic relationships*. Major changes in production, marketing and the requirements of consumers are

indicated, emphasis being laid on the rapid expansion in demand, first for canned orange juice, and then, within the past 4 years, for frozen concentrated juice.

755. JOHNSTON, J. C.

Citrus growing in California.

Circ. Calif. agric. Exp. Stat. 426, 1953, pp. 43, bibl. 24, illus.

This circular, which replaces *Ext. Circ.* 114, includes information on the areas in California where citrus is grown, the main varieties (Washington Navel and Valencia oranges, Eureka and Lisbon lemons and Marsh grapefruit), the selection of trees for planting and of an orchard site, cultural practices (irrigation, manuring and frost protection), the control of diseases and pests, the keeping of accurate records and literature recommended for reading.

756. JOHNSTON, J. C.

Factors determining yield in citrus orchards.

Calif. Citrogr., 1953, 38: 426, and *Citrus Leaves*, 1953, 33 (10): 8.

A 5-year survey of 400 Navel and Valencia orchards in California showed that the main factors promoting high yields were a relatively high rate of irrigation and good physical conditions in the soil. Some yield advantages also resulted from close spacing (defined as crowding), the absence of nutritional deficiencies, the absence of wind damage, and the use of nitrogenous fertilizers. There were no clear differences between trees on sweet or sour orange rootstocks or between trees of different ages. The fact that frost-damaged orchards yielded more than undamaged orchards is attributed to superior soils in the colder localities—an indication of the care necessary in interpreting data of this kind.

757. HARDING, R. B., CHAPMAN, H. D., AND WHITING, F. L.

Yearly size fluctuations of California Valencia oranges.

Calif. Citrogr., 1953, 39: 2-3, 12, 14-18, bibl. 26, and *Citrus Leaves*, 1953, 33 (11): 8-10, 36-7, bibl. 26.

Fruit size records from 153 Valencia orchards covering the period 1932 to 1952, inclusive, show distinct annual fluctuations, but in particular a marked and simultaneous decrease in sizes in all districts, except Tulare county, lasting from 1945 until 1950 and 1951 when there was a substantial upswing followed by a drop again in 1952. A brief discussion of the literature covering known and suspected factors affecting size is followed by an examination of climatic and other data from which it is concluded that: (1) The decreases in size during the 1945-49 period were probably due primarily to some climatic circumstance or combination of circumstances, though no simple correlations were found linking size with single features of climate. (2) The decrease may be accentuated locally by such soil conditions as water deficits, low K, high P, deficiencies of Zn, Mn and Mg, and excess salinity, or by such factors as insect build-up, certain pest control treatments, advancing age of trees, and disease; none of these, either alone or in combination, can, however, account for the whole decline. Suggestions are made for further research into the problem.

758. C.S.I.R.O., AUSTRALIA.

Investigations at the Irrigation Research Station (Murrumbidgee Irrigation Areas), Griffith, N.S.W.

A.R. C.S.I.R.O., Aust., 1951/52, 1952, pp. 36-7.

Horticulture: The tendency for bare soil citrus trees (untilled, weeds controlled by oil spray) to give greater yields of fruit than trees under other treatments held good. A manganese deficiency survey indicates that the deficiency is more severe on orange rootstocks than on rough lemon and under heavy irrigation than under light. A method of removing red scale from oranges after harvest was evolved; after fumigation with HCN the fruit is passed through a descaling bath and the dead scales are brushed off.

Citrus—varieties, rootstocks and propagation.

(See also 832e, r.)

759. KLIMENKO, K. T., AND KLIMENKO, V. N.
New seedling varieties of citrus. [Russian.]

Agrobiologija, 1951, No. 3, pp. 69-81, bibl. 4, illus.

Some of the citrus seedlings raised at Batum since 1938 are hardier and produce better quality fruit than their mother plants. A description is given of orange, lemon and pomelo seedlings and in particular of nucellar seedlings of the Unshiu mandarin, future generations of which are expected to show further improvement. According to the Mičurin school new nucellar seedlings may differ from their initial material as a result of changes in environmental conditions. Seedlings top-worked on the Unshiu mandarin developed faster and was hardier and produced higher yields of better quality fruits than when grown on their own roots. Mandarins were also worked on trifoliate rootstock with good results.

760. ERICKSON, L. C., AND BITTERS, W. P.

Effects of various plant-growth regulators on rooting of cuttings of citrus and related species.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 84-8, bibl. 3, being *Pap. Calif. Citrus Exp. Stat.* 759.

Six species representing six genera of the Rutaceae, including lemon, were used for a study of the rooting response of cuttings treated with four plant-growth regulators. The latter were naphthaleneacetic acid, indolebutyric acid, 2,4-dichlorophenoxyacetic acid and 2,4,5-trichlorophenoxyacetic acid. No single growth regulator was best for rooting all the species, but each one was better than the others in some regard or for some particular species. [From authors' summary.]

761. LARUE, R. G.

Report on scions used in stump grafting old citrus.

Citrus Leaves, 1953, **33** (9): 8-9, bibl. 5, illus.

Scions used in stump grafting.

Calif. Citrogr., 1953, **38**: 404-5, bibl. 5, illus.

Stump grafting old citrus.

Calif. Agric., 1953, **7** (10): 6, illus.

Further details are given of an experiment now in its fifth year in which 144 75-year-old seedling oranges

were stump grafted with navel orange scions in 1949 [see *H.A.*, 20: 1906, 21: 967 and 23: 4506]. From 8 to 10 and occasionally 12 scions were inserted per stump and 55% united; 19 stumps needed complete re-working. Among 4 types of scion wood used the percentage takes were: young, angular, green scions 57; round, green, 43; green-barked, hardwood, 72; and grey-barked, hardwood, 14. There was little difference in the take or growth of scions set on the N, S, E or W sides of the stumps.

762. MAJSURADZE, N. I.

The acquisition of seeds in navel oranges.

[Russian.]

Agrobiologija, 1951, No. 1, pp. 105-8, illus.

Artificially cross pollinated navel oranges produced viable seeds. The highest number of seeds was obtained from pollination with pomelo or pollen mixtures including pomelo.

Citrus—cultivation, irrigation and frost protection.

(See also 164, 832b, c, i.)

763. ROSSELET, F.

Nitrogen in citrus soils under permanent grass.

Fmg S. Afr., 1953, **28**: 275-7, 286, bibl. 5, illus.

The effect of different cultural treatments on the nitrogen status of citrus soils was investigated at Nelspruit during 1948-1950. Five treatments included permanent grass, complete or partial clean cultivation and permanent legume. Irrigation and fertilizer treatments were comparable. Total N estimated from soil samples was highest in the permanent grass plots, but available N was only 28.4% compared with about 50% with other cultural treatments. The trees on the grassed plots showed N deficiency symptoms which were partially corrected by the addition of ammonium nitrate. J.S.

764. PATT, Y.

(1) **Efficiency of irrigation by sprinkler and adequacy of methods used for testing water distribution.**

(2) **Water requirements of citrus trees in the coastal plain of Israel.**

(3) **Results of citrus grove thinning by grubbing trees.**

Bull. Rehovot agric. Res. Stat. **60**, 1953, pp. 1-16, bibl. 8, illus., pp. 17-35, bibl. 16, and pp. 36-45, bibl. 3.

(1) In view of the better water distribution and the reduced evaporation from drops travelling a short distance, overhead sprinklers proved superior to overhead sprinklers for the irrigation of citrus groves in Israel. The effects of irrigation on the microclimate of the orchard are recorded and methods of sprinkler testing are discussed. The paper summarizes the results of experiments conducted 1945-47. (2) The water requirements of citrus trees in the coastal plain of Israel, as determined in these trials, were found to be much below those allowed for by growers. Several varieties of citrus worked on different rootstocks were shown to be best suited by the application of about 700 m.³ per dunam (=1,000 sq. m.) per season, to be supplied in dosages of 50 m.³ on light soils and of

50-70 m.³ on medium soils. In these studies irrigation needs were assessed by either of the following two methods: (a) by the kerosene test (rate of kerosene absorption by the leaf through its stomata), or (b) by measuring the rate of fruit growth, both of which proved to be reliable indicators. (3) 17-year-old Shamouti oranges budded on sweet lime, which were grown at a density of 60 trees per dunam, were thinned to 30-40 trees per dunam in three experimental groves. The vegetative response of the trees expressed as increase in girth and size of top was determined. The average increase in top size ranged from 63% to 115%, while increases in girth ranged from 20.8% to 38%. Data regarding quantity, size and quality of fruit were highly significant. It is apparent that grubbing the trees prior to blooming increases the crop of the remaining trees in the first year after thinning.

765. DE BOIXO, —.

Une expérience d'irrigation au Bled Cheraia (Maroc). (An irrigation experiment at Bled Cheraia in Morocco.)

C. R. Acad. Agric. Fr., 1953, 39: 597-601.

The 15-year-old Washington Navels at Bled Cheraia require 4,000 cu. m. of water per ha. per annum in addition to the 600 mm. annual rainfall. The NaCl content of the water is always comparatively low (0.2 g. per l.) between the end of December and the end of April and the experiment described showed that it is possible to store nearly 5,000 cu. m. of water in the soil at that season. It is hoped that it will not be necessary to give more than one irrigation in the summer (the season of strong salinity) and that the small quantity of salt thus introduced will be subsequently leached by the rains.

766. TUMANOV, I. I.

New methods of protecting lemon plantations from frost. [Russian.]

Priroda, 1953, 42 (6): 91-5, illus.

In the Crimea, young lemon trees under individual tents, constructed of 3 thicknesses of muslin, withstood frosts of -8° or -9° C. Experiments conducted by the Ministry of Agriculture in collaboration with other organizations on citrus orchard heating are outlined, and it is shown that well constructed portable orchard heaters burning slow combustion fuel can raise the temperature on still nights at the height of 1 m. by 5° - 7° C. and at 2 m. by 3.5° - 5.5° C. As fuel, activated peat briquettes, type ENIN, and a peat semi-coke were found most suitable. The heaters were placed well under the trees, which were in no way affected by the heat generated by slow combustion. The method was also found effective for the protection of citrus grown under cover, i.e. in trenches or sheds. Frost prevention by smoke was also tested, for which purpose burning red phosphorus was found more satisfactory than the usual materials used such as peat, dung or refuse.

Citrus—tree composition and nutrition.

767. HEYMANN-HERSCHBERG, L.

Soil and leaf analyses as indicators of fertiliser requirement in Shamouti orange groves.*

Bull. Res. Coun. Israel, 1952, 1 (4): 20-37, bibl. 47.

* Abridged translation of Hebrew Ph.D. thesis University of Jerusalem.

Soil and leaf analyses were made in Shamouti orange groves. Five to eight leaf samples were found necessary for determining the nutritional status of an orange grove of 2 dunams [1 dunam=1,000 sq. m.], while 20 soil samples or more were needed to estimate soil nitrates in this area. The results obtained have already been summarized [see *H.A.*, 23: 1134].

768. MARTIN, J. P., HARDING, R. B., AND MURPHY, W. S.

Effects of various soil exchangeable cation ratios on growth and chemical composition of citrus plants.

Soil Sci., 1953, 76: 285-95, bibl. 9, illus., being *Pap. Calif. Citrus Exp. Stat.* 766.

Two successive batches of orange seedlings and tomato and barley plants were grown in pots containing 2 soil types adjusted to provide various exchangeable Ca, K, Na, H, and NH_4 ratios and excess of CaCO_3 . Growth of citrus seedlings was slightly reduced by 15% exchangeable K and by excess CaCO_3 and was appreciably reduced by 28% K, 14% Na and 10-17% exchangeable NH_4 . Tomato and barley plants grew well at all exchangeable cation ratios tested. In all tests the first crop of orange seedlings, harvested at 8 to 9 months, reduced growth of the second crop but the depressing effect was less marked in soils containing 4-8% K, in soils containing little Na, and in soils slightly to moderately acid. K and Na were equally effective in reducing Ca and Mn absorption by the citrus seedlings. Mn was reduced to the deficiency level by 15% K, by 7% Na plus 8% K, and by an addition of 0.5% CaCO_3 to base-saturated soil. Mg absorption was not appreciably reduced by Na or K until the 28% level was attained. Leaf and root K was increased by exchangeable Na. Increase of exchangeable K or Na in soil from <1 to 28% decreased Ca absorption by tomato and barley plants but had little effect on Mg uptake. Lower percentages of Na slightly increased K absorption by these plants, but the higher percentages decreased the K content.

769. SMITH, P. F., REUTHER, W., AND KENNETH, G.

Effect of differential supplies of nitrogen, potassium and magnesium on growth and fruiting of young Valencia orange trees in sand culture.

Proc. Amer. Soc. hort. Sci., 1953, 61: 38-48, bibl. 8, illus.

Three levels each of N, K and Mg were used in all combinations. Of the three elements, N exerted by far the greatest effect on tree growth and fruiting. The highest rate of N application resulted in doubling of tree dry weight, increase in percentage dry matter of all tissues, a nine-fold increase in yield, reduced fruit size, increased juiciness, increased total soluble solids and decreased ascorbic acid content of the juice compared with the lowest N rate. The highest rate of K application resulted in a decrease in the dry matter percentage of all tissues, increased mean fruit size and rind thickness, decreased juiciness, lowered total soluble solids and increased acidity of juice as compared with the lowest K rate. Ascorbic acid was not affected by K. The rate of Mg supply had no effect on total tree dry weight despite the fact that most of the trees at the low rate showed typical deficiency symptoms in the foliage most

of the time. The intermediate rate of Mg also produced trees with considerable deficiency symptoms when in combination with high K. Yield was reduced only when severe deficiency symptoms were evident. This also resulted in reduced fruit size, lower total soluble solids and lower ascorbic acid content of the juice. A parallelism was noted to exist between the effects of these elements on the dry matter content of vegetative plant parts and on the total soluble solids of the juice. [From authors' summary.]

770. VAN DER MERWE, A. J.

Nitrogen nutrition of citrus in the nitrate and ammonium form.

Sci. Bull. Dep. Agric. S. Afr. **299**, 1952, pp. 158, bibl. 155, illus.

A series of field and other experiments was conducted in the Rustenburg area of the Transvaal in 1939-47 to determine the influence of the nitrate and ammonium forms of N on the nutrition of orange trees. In the field studies young Navel, Valencia and Bailidge Early on rough lemon were employed. The effects are discussed of differential fertilizer treatment on the quantity and change in form of inorganic N in the soil, and of ammonium and nitrate N applications on yield and quality under orchard conditions; of the 2 forms of N on top growth and root development, and on the chemical composition of young leaves of young citrus trees grown in sand cultures; and finally of the 2 forms of N on the absorption of the ionic forms of N, P and Ca by rough lemon trees in water cultures, and on tree appearance and chemical composition of these plants.

771. WALLACE, A.

Nitrogen absorption and translocation by citrus cuttings at different root temperatures.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 89-94, bibl. 10.

Sufficient nitrogen was absorbed by rooted Valencia orange cuttings from a nutrient solution containing nitrogen labelled with N^{15} and kept at 48° F. to increase the N content of the whole plants by 0.04% of dry weight in a 12-day period. This temperature is considerably below the threshold value for citrus root elongation. The rate of absorption increased up to 74° F. and then levelled off and decreased at 90° F. For the average of all treatments, 2.6 times as much N^{15} moved to the leaves at 58-60° F. and 3.4 times as much at 74-80° F. as at 48° F. Increasing the test period from 12 to 22 days but without solution renewal increased only slightly the amount of N moving from roots to leaves. Increasing the initial level of N in the roots resulted in a considerably smaller amount of N absorption in a 12-day period and did not result in any greater translocation rate of N^{15} to leaves. J.S.

772. HARDING, R. B.

Soil phosphorus in California orange orchards in relation to yield, fruit size and phosphorus in leaves.

Proc. Amer. Soc. hort. Sci., 1953, **61**: 31-7, bibl. 10, being *Pap. Calif. Citrus Exp. Stat.* **757**.

A survey of the phosphorus status of 79 California orange orchards showed no significant differences between high-yielding orchards producing large sized fruit and low-yielding orchards producing small sized

fruit. This was true with regard to both water and acid-soluble phosphorus from various depths and on different soil types and phosphorus content of leaves. [Author's summary.]

773. HEYMANN-HERSCHBERG, L.

Phosphorus fertilization of Shamouti orange groves. [Hebrew, with abridged English translation 3½ pp.]

Ktavim, 1952, **2/3**, Hebrew pp. 83-92, bibl. 24, English pp. 19-22.

Three experiments are described on the application of superphosphate to orange groves that had either just been heavily pruned or already produced large, coarse fruit indicative of P deficiency. The results suggest that substantial applications of P are only likely to have desirable effects on yields as well as on fruit quality in areas suffering from a relative P deficiency. Elsewhere, and particularly under conditions of low N supply, P may reduce yields through reducing N absorption, and may under some conditions also affect quality adversely.

774. SMITH, P. F., AND SPECHT, A. W.

Heavy-metal nutrition and iron chlorosis of citrus seedlings.

Plant Physiol., 1953, **28**: 371-82, bibl. 12.

Studies were made on the responses to differential supplies of copper, zinc, manganese, and iron shown by sweet orange and mandarin seedlings grown in vermiculite and solution cultures with the pH maintained near 4. The first three metallic ions were all found to interfere with Fe metabolism in such a way as to induce chlorosis under certain conditions. Relatively low concentrations of these elements also were toxic to roots. These two effects appeared to be related in that it was not possible to induce chlorosis without simultaneously inducing toxicity to roots. They were produced in solution cultures with 0.1 p.p.m. Cu, 3 p.p.m. Zn or 5 p.p.m. Mn, the lowest supplementary levels used. Copper appeared to be about 50 times as toxic as Mn and 12 to 15 times as toxic as Zn. The analytical data presented show that Cu accumulates in roots, even to the point of toxicity, without being transported to the upper parts of the plants in increased amounts. Both Zn and Mn show marked accumulation in the roots as well as substantial distribution within the plant when these elements are increased in the nutrient solution. The data also show several cases of interference in accumulation of one element by another. The form of nitrogen also appreciably affected the behaviour of several of these metals. [From authors' summary. For a preliminary account see *H.A.*, **23**: 3436.]—Bureau of Plant Ind., Orlando, Fla., and Beltsville, Md.

775. WALLIHAN, E. F.

Iron chlorosis—what is it?

Calif. Citrogr., 1953, **38**: 414-16, and *Citrus Leaves*, 1953, **33** (9): 12-13, illus.

Earlier attempts to relate iron content of citrus leaves to iron chlorosis patterns failed through inadequate washing of leaves. When samples were washed with soap extremely chlorotic leaves were found to contain less than 30 p.p.m. iron, severely chlorotic generally 25 to 40 p.p.m., moderately chlorotic up to about 70 p.p.m., and normal up to 100 p.p.m. and over,

but with a few samples between 40 and 70 p.p.m. In further studies to determine why normal or near-normal leaves showed such a wide range of iron concentrations it was found that the chlorophyll content was proportional to the iron content and that iron deficiency does not always result in a chlorosis pattern but may produce paling of leaves similar to those caused by nitrogen deficiency.

776. N.S.W. DEPARTMENT OF AGRICULTURE.

Magnesium deficiency of citrus.

Agric. Gaz. N.S.W., 1953, **64**: 433-4, illus.

Mg deficiency in citrus is very prevalent in the central coast area of N.S.W. The symptoms and the rates of application of dolomite for control under various conditions are given.

777. HAAS, A. R. C., AND BRUSCA, J. N.

Molybdenum-deficiency symptoms in lemon and grapefruit leaves.

Citrus Leaves, 1953, **33** (8): 6-9, 36, bibl. 13, illus.

When rooted sweet orange cuttings were grown in serpentine soil known to be deficient in Mo and supplied with nutrient solutions containing KNO_3 , with and without CaSO_4 and Mo, severe Cu deficiency symptoms developed, especially in the presence of CaSO_4 . Once the Cu deficiency was corrected Ca became a limiting factor and only when this had also been corrected did Mo deficiency symptoms appear and the plants respond to added Mo. Avocado seedlings grown in the same serpentine soil cultures showed no symptoms of any kind, but growth was much increased by addition of CaSO_4 to the KNO_3 nutrient solution; the further addition of Mo had no obvious effect, probably owing to the presence of sufficient Mo in the seed. In sand culture trials, however, improved growth of avocado has followed the addition of small quantities of Mo. In further tests with lemons grown in serpentine soil cultures and grapefruit in sand cultures, Mo deficiency symptoms, consisting of variegated mottling throughout the leaf blade, were reproduced. In grapefruit the trouble was readily corrected by adding 0.05 p.p.m. Mo as sodium molybdate to the nutrient solution.

Citrus—growth phenomena.

778. MENDEL, K.

Studies on the vitality of citrus branches. Part 2: Electric conductivity of vigorous and declining branches. [Hebrew, with abridged English translation 2½ pp.]

Ktavim, 1952, **2/3**, Hebrew pp. 65-82, bibl. 42, illus., English pp. 15-17.

Measurements of electric conductivity, without an external source of electric current, were made under a wide range of field conditions on Shamouti orange branches of various ages and in various conditions of health. The methods used are described and the results discussed with reference to other findings reported in the literature. Differences between the conductivity of the bark in longitudinal and transverse directions were highly significant, the former showing the higher values. No differences in conductivity were found between different points around the axis of the branch. Conductivity of bark was markedly reduced when it was removed from the branch, which suggests that the

xylem plays an important part in the conduction of electric current. Conductivity was found to change with age and thickening of the branches. It reached a maximum in 3- to 4-year-old branches, about 4 cm. in diameter, and then declined with advancing age and further girth increment. This conflicts with the general assumption that electric conductivity rises uninterruptedly with age-induced decrease in vitality. In the course of investigations into the cause of the optimum curve of conductivity it was found that irrigation caused a significant rise in conductivity, that when the amount of dry matter in bark tissues was plotted against their conductivity a curve very similar to the optimum curve of conductivity resulted, and that a highly significant positive correlation existed between the age of the bark and its dry matter content. It is deduced from these facts that the water content of the tissues plays a decisive part in determining the maximum reached by curves of conductivity. It would appear likely that the lower conductivity of declining branches is due to their lower water content. The character of the conductivity curve of vitality, i.e. the optimum curve, precludes the use of conductivity as a means of quantitatively assessing the vitality of citrus branches. The author discusses the close correlation that exists between senescence and devitalization in plant tissues. He opposes the concept which suggests that senescence proceeds in a cyclic rhythm with each cycle representing a distinct unity; instead he visualizes the progress of senescence as a continuous though undulating curve, with waves in place of separate units. [For Part 1 see *H.A.*, **23**: 1116.]

779. RHOADS, W. A., AND WEDDING, R. T.

The photosynthetic and respiratory rates of citrus leaves of four different ages.

Citrus Leaves, 1953, **33** (9): 10-11, bibl. 2.

Leaf drop in citrus.

Calif. Agric., 1953, **7** (10): 9.

Photosynthesis and respiration were measured in leaves of Washington Navel and Valencia oranges and of Eureka lemon, representing 4 age-groups ranging from very young growing leaves to leaves that were 20-30 months old but not yet showing obvious signs of senescence. All three varieties showed a similar pattern. The photosynthetic rates in very young leaves were low but increased rapidly to reach a peak at full maturity; thereafter the rate declined gradually, although it was still high in the oldest leaves. Respiration rates were relatively high in very young leaves but declined at first sharply and then gradually as the leaves matured and aged. These results indicate that only the very youngest leaves are parasitic on the tree in that they produce less food than they consume, and that the loss of old leaves through spray damage, insect damage or other causes probably interferes materially with total carbohydrate production by the trees.

780. ČAIŁAHJAN, M. H., AND NEKRASOVA, T. V.

The influence of the length of day and light intensity on the growth of citrus plants. [Russian.]

Doklady Akad. Nauk S.S.S.R., 1952, **86**: 865-8, bibl. 10, illus.

In citrus—various lemons, orange hybrids and others—grown in high latitudes, the length of daily illumination in summer appears favourable to growth and the

formation of leaves and stems, while the factor most unfavourable to growth in winter is low light intensity. The trees can, however, adapt themselves to low light intensity and do not therefore suffer a severe check to growth.

781. ENIKEFF, —.

Le système racinaire des arbres fruitiers dans la région de Marrakech. (Fruit tree root systems in the Marrakesh district [of Morocco].)

Fruits et Prim., 1953, 23: 181-5, illus.

The studies were made in 2 different localities in connexion with an irrigation scheme. The lengths of the laterals and the tap roots respectively were 2-4 m. and 40-50 cm. in 18-year-old Washington Navels (the roots failing to penetrate a dense layer of pebbles in a matrix of heavy clay at 50 cm. below the surface), 2.0-4.5 m. and 80-90 cm. in 12-year-old Washington Navels, 1.5-4.5 m. and 80 cm. in 15-year-old clementines, 4-5 m. and 30-40 cm. in 17-year-old apricots, 4-5 m. and 76-90 cm. in 10-year-old Canino apricots, and 4.0-5.5 m. and 90 cm. to 1 m. in 15-year-old olives.

Citrus—fruit composition.

(See also 832j, k.)

782. UNDERWOOD, J. C., AND ROCKLAND, L. B. Nitrogenous constituents in citrus fruits. I. Some free amino acids in citrus juices determined by small-scale filter-paper chromatography.

Food Res., 1953, 18 (1): 17-29, from abstr. in *Semiannual List Publs west. reg. Res. Lab.*, Jan.-June 1953, AIC-321 Suppl. 4, p. 13.

Small-scale filter-paper chromatography procedures have been applied to the determination of the nitrogenous constituents in the filtered juices of orange, tangerine, grapefruit, lemon, lime, kara, kinnow, honey and a lemon-orange hybrid. The character and quantities of the free amino acids and related compounds in the juice of most of the citrus fruits appear to be characteristic of the variety and independent of the geographical origin of the fruit.

783. KHAN, M.-U.-D., AND MACKINNEY, G. Carotenoids in grapefruit, *Citrus paradisi*. *Plant Physiol.*, 1953, 28: 550-2, bibl. 5.

Data are tabulated on the lycopene, β - and γ -carotene and phytofluene content of 4 grapefruit mutants with coloured or white fruit flesh.—Univ. Calif., Berkeley.

784. SAMISH, Z., AND COHEN, A.

The effect of frost on the composition of Shamouti oranges. [Hebrew, with abridged English translation 4 pp.]

Ktavim, 1952, 2/3, Hebrew pp. 109-22, bibl. 13, English pp. 27-30.

1. The composition and physical properties of Shamouti oranges damaged by the frosts of 1949 and 1950 were determined, with particular reference to suitability for industrial use. Damaged fruit retained on the tree was compared with similar stored fruit. 2. No external marks were detected on the injured fruit, but internal signs of damage were noted, such as air-spaces between the segments, dryness of the fruit pulp, hesperidin crystals on the segment walls, and thickening of the

peel. 3. The specific gravity and the juice content of damaged oranges decreased while the weight of the peel and of the peel residue showed an increase. The content of total solids, of sugar, ascorbic acid and essential oil, and the pectin content of the peel, were not affected to any extent. The peel of frost-damaged fruit was found to contain less sugar than the peel of healthy fruit. 4. Juice from frost-damaged fruit tasted more bitter than that from healthy fruit. While the bitterness of healthy fruit disappeared fairly quickly in the course of ripening, this process was much slower in frost-injured fruit. 5. Sugar content increased during the ripening of healthy fruit, but not in frost-damaged fruit retained on the tree. The sugar accumulation in healthy fruit appears to be due to transpiration rather than to sugar synthesis. 6. In frost-damaged fruit, the sugar content decreased in the juice, but not in the fruit as a whole, suggesting that sugars are translocated from the inner pulp of the injured fruit to the rapidly thickening peel. 7. The harmful effects of frost damage were considerably lessened when fruit was harvested straight away and stored at room temperature. 8. Frost-damaged fruit would be more suitable for concentrates than for pasteurized juice, since in the former the bitter taste disappeared within 2 to 3 weeks, while in the latter it persisted for a long time. [From authors' summary.]

785. ALDERMAN, D. C., AND GODFREY, G. H. An analysis of the factors entering into fruit quality of Valencia oranges following a damaging freeze.

Proc. Amer. Soc. hort. Sci., 1953, 61: 275-80, bibl. 8.

A method is described for predicting fruit quality of Valencia oranges following a freeze by estimating soluble solid values of the fruit. J.S.

786. HARDING, P. L.

Effects of oil-emulsion and parathion sprays on composition of early oranges.

Proc. Amer. Soc. hort. Sci., 1953, 61: 281-5, bibl. 8.

Experiments were conducted in Florida to compare the effects on the subsequent quality of young oranges of oil-emulsion and parathion sprays which are equally effective in the control of purple scale. Fruit treated with parathion was superior in total solids content to that treated with oil-emulsion. The latter also lowered the total acid content and slightly depressed the ascorbic acid content of the fruit. J.S.

Citrus—diseases and pests.

(See also 832a, f, h, l, n, p, u, 1056.)

787. BITTERS, W. P., AND PARKER, E. R.

Quick decline of citrus as influenced by top-root relationships.

Bull. Calif. agric. Exp. Stat. 733, 1953, pp. 35, bibl. 58, illus., being *Pap. Calif. Citrus Exp. Stat.* 744.

This bulletin, the first of a series of progress reports, gives the history of quick decline in California and the results of studies on the tolerance of commercially important scions to the disease when budded on a wide range of species and varieties of rootstock, and of experiments on alterations in the top-root relationships

of established trees. The results of sweet orange susceptibility studies up to August 1950 were: (1) susceptible on sour orange, shaddock, shaddock × sweet orange, grapefruit, lemon (except rough), some mandarin hybrids, *Citrus ichangensis* hybrids, Palestine sweet lime and *C. macroptera*; (2) uncertain on trifoliolate orange and its hybrids, some mandarins, many mandarin hybrids and some sweet oranges; and (3) tolerant on acid and mandarin limes, some mandarins, several mandarin hybrids, some sweet oranges, rough lemon and *C. moi*. Top working sweet orange over to lemon was generally successful provided the whole of the orange top was removed; but top working over to grapefruit was unsatisfactory. Grapefruit/sweet orange/sour orange was susceptible. Inserting a tolerant interstock into susceptible trees appeared to hasten the development of symptoms. When the top was susceptible on a particular stock it remained so when the stock species was inserted as an interstock over a normally tolerant stock. Inarching experiments are described; the slow development of the tops suggested that the replanting of tolerant combinations is more practical than inarching. [See also *H.A.*, 23: 3441.]

788. DE SEGURA, C. B.

La "tristeza" de los citricos en el Peru.
(The tristeza disease of citrus in Peru.)
Inf. Cent. nat. Invest. Exp. agric. Lima,
77, 1952, pp. 14.

A description is given of the symptoms of a disease of Washington Navels first observed at Huando 5 years ago and held to be tristeza.

789. CALAVAN, E. C.

The relationship of fungi to shell bark of lemon trees.

Abstr. in *Phytopathology*, 1953, 43: 467-8.

Diaporthe citri, *Diplodia natalensis*, *Botrytis cinerea*, and *Botryosphaeria ribis* in wood inoculations have each been found capable of inducing and enlarging shell-bark lesions on susceptible Eureka lemon trunks. Typical shell bark was induced only when inoculations were made into mature bark of trees already showing indications of shell bark development. Naturally occurring shell-bark lesions usually contain no fungi at first, but are soon invaded by one or more species. The role of fungi in most shell-bark lesions is evidently that of invaders of dead or dying tissues. Lemon bark often reacts to these invaders by gum formation, additional necrosis, and phellogen development. The resistance of lemon trees to shell bark depends partly upon the presence of a strong wound-healing potential in the outer bark. In resistant bark healing occurs through and beneath the cortex and delimits injuries, but in highly susceptible bark it proceeds only in tissues beneath the cortex and results eventually in the tangential separation of outer and inner bark layers.

790. FORD, H. W.

Changes in rate of respiration and catalase activity associated with spreading decline of citrus trees.

Proc. Amer. Soc. hort. Sci., 1953, 61: 73-6,
bibl. 5, being *J. Ser. Fla agric. Exp. Stat.* 89.

There was a progressive increase in respiration rate from the decline area up to, and including, the third healthy tree beyond the decline margin. The respiration

rate of healthy trees beyond the fourth tree was slightly lower than the third tree. In every grove tested, the third and fourth healthy tree beyond the decline margin had the highest catalase activity. [Author's summary.]

791. SHERBAKOFF, C. D.

Fusaria associated with citrus feeder roots in Florida.

Phytopathology, 1953, 43: 395-7, bibl. 5,
illus., being *J. Ser. Fla agric. Exp. Stat.* 145.

The association of Fusaria with citrus roots indicates a probability that they may play some part, not clear at present, in the life of the citrus trees in Florida. The Fusaria of the Martiella and Elegans sections were found to be closely associated with citrus feeder roots in Florida but they appeared to have no direct pathogenic role in the spreading decline disease of citrus trees. [Author's summary and conclusions.]-Univ. Fla, Gainesville.

792. RUGGIERI, G.

La lotta contro il "mal secco" degli agrumi. (Control of mal secco disease in citrus.)

Periodicità nelle infezioni di "mal secco" e fondamentali orientamenti di lotta.
(Periodicity of infection with mal secco disease and the framing of control measures.)
Giorn. Agric., 1953, 63 (30): 3, 63 (34): 5,
from abstr. in *Not. Mal. Piante*, 1953, 2 (23): 59.

Mal secco disease can be controlled with copper salts and possibly with organic mercury. A 1% Caffaro spray + 0.25% sticker gave control in 194 out of 200 plants.

Despite a dry autumn and winter in Sicily, infection occurred between November and February. There was little or no infection in March-May despite rain, and spring incidence was therefore a result of primary autumn-winter infection. Plants regularly watered on the leaves showed less infection than the controls. It is concluded that in the mild climate of Sicily the susceptibility of citrus to *Deuterophoma tracheiphila* depends on the vegetative activity of the tree.

793. MINZ, G., AND BEN-MEIR, Y.

Comparative pathogenicity of potential causal agents of stem-end rot in Shamouti orange.

[Hebrew, with abridged English translation 1½ pp.]

Ktavim, 1952, 2/3, Hebrew pp. 141-5, bibl. 9, English pp. 39-40.

In addition to *Diplodia natalensis*, the principal causal agent of stem-end rot of Shamouti oranges in Israel, *Phomopsis citri* and another *Phomopsis* sp. and *Dothiorella gregaria* were found capable of causing stem-end rot. *Alternaria citri* and *Colletotrichum gloeosporioides* showed weak pathogenicity and *Glomerella cingulata* and a *Phoma* sp. none.

794. AVIDOV, Z., AND SWIRSKI, E.

Laboratory tests on the effect of chlorinated hydrocarbon compounds on the Mediterranean fruit fly. [Hebrew, with abridged English translation 3½ pp.]

Ktavim, 1952, 2/3, Hebrew pp. 191-7, English pp. 53-6.

In tests against Mediterranean fruit fly DDT proved

inferior in both direct and residual toxicity to methoxychlor and dieldrin at equivalent concentrations. The toxicity of all three materials was more persistent on orange leaves than on apple leaves. Sprinkler irrigation equivalent to 40-50 mm. rain applied 6-7 days after spraying largely eliminated residual toxicity. Flies coming in contact with sprayed leaves within 2 weeks of spraying appeared incapable of normal oviposition.

795. BAINES, R. C., AND MARTIN, J. P.
Effect of soil fumigation on growth and yield of Valencia orange trees.
From abstr. in *Phytopathology*, 1953, 43: 465-6.

Preplanting treatment with various soil fumigants on a sandy loam soil previously cropped to oranges increased the growth and yield of young Valencia orange trees. In the 0-5 ft. horizon samples the citrus nematode was eradicated by DD and EDB, but small percentages survived chloropicrin and carbon disulphide. Deep injection did not increase nematode control or improve tree growth and yield.

796. EWART, W. H., AND ELMER, H. S.
Unarmored scale treatments on California citrus (except black scale).
Citrus Leaves, 1953, 33 (8): 15.

Following an investigation into the effect of controlling unarmoured scales on citrus yields [repeated in this number of *Citrus Leaves*, p. 14, and abstracted in *H.A.*, 23: 4524] the authors submit a general spray chart indicating suitable insecticides, time and method of application, and dosages for use against each of the following: citricola scale (*Coccus pseudomagnoliarum*), cottony-cushion scale (*Icerya purchasi*) and soft brown scale (*Coccus hesperidum*).

797. CORTES, R., AND CAMPOS, L.
Acción de insecticidas sistémicos sobre estados larvarios de conchuela negra del olivo (*Saissetia oleae* Bérn.). (The effect of systemic insecticides on the larvae of the olive black scale, *Saissetia oleae*.) [English summary 10 lines.]
Agric. Téc. Chile, 1952, 12: 5-10.

The effect of OMPP (66%) on *Saissetia oleae* larvae (second instar) on young citrus was studied in glass-house experiments. The mortality rates obtained were 95% and 98% with a 0.5% emulsion leaf spray, 57% and 69% with a 0.5% soil application, 51% and 56% with a 0.1% leaf spray, 36% and 60% with a 0.1% soil application, and 18% and 22% in the control.

798. EWART, W. H., AND ELMER, H. S.
Treatments for control of citrus thrips in California.
Calif. Citrogr., 1953, 39: 4.

Spray schedules giving details of insecticides, timing and method of application, and dosage are tabulated for the treatment of different types of citrus against *Scirtothrips citri*.

799. ATKINS, E. L., Jr.
Treatments for the control of orangeworms in southern California.
Calif. Citrogr., 1953, 38: 428, and *Citrus Leaves*, 1953, 33 (10): 6-7.

Citrus foliage and fruit in southern California are subject to attack by 20 species of moth whose larvae are known as orangeworms. Recommendations are here tabulated on insecticides (mainly parathion, DDD or cryolite), time and method of application, and dosage for controlling each of the following: orange tortrix (*Argyrotaenia citrana*), pyroderces or pink orangeworm (*Pyroderces rileyi*) and fruit tree leaf roller (*Archips argyrospila*).

Citrus—harvesting, packing, storage and products.

(See also 9, 195, 308, 832t, 842.)

800. PROSSER, D. S., AND OTHERS.
New system of bulk handling for citrus packing houses.
Citrus Mag., 1953, 16 (2): 14-15, illus.

A system of bulk handling from grove to final packing operation is described which obviates the use of field boxes and effects an estimated saving of 5.4 cents a box. The main features are the use of 2-wheel trailers in the grove each holding the equivalent of 20 boxes of fruit, a tilted ramp at the packing house to facilitate emptying of the trailers on to conveyor belts, automatic sizing, dipping, washing and drying, removal on distributor belts to specially designed bulk colouring rooms allowing discharge by gravity onto belts for removal for final packing. Details may be obtained from the Citrus Experiment Station, Lake Alfred, Florida.

801. LONG, J. K.
Mould wastage in oranges can be controlled successfully.
Agric. Gaz. N.S.W., 1953, 64: 485-6, 494.

A new dip consisting of a mixture of sodium orthophenylphenate and hexamine shows promise of being more successful than borax for the control of green mould [*Penicillium digitatum*] in oranges. Lemon storage experiments extending over several seasons have shown that the coastal main crop, when carefully harvested in June at the light green-silver stage of maturity, can be kept in good condition in orchard shed storage for 6 months with less than 5% loss and 99% retention of fresh green colour in the buttons by dipping immediately after picking in 500 p.p.m. 2,4-D plus 0.25% Shirilan W.S.

802. BIALE, J. B.
Storage of lemons in controlled atmosphere.
Calif. Citrogr., 1953, 38: 427, 436-8.

From the results of experiments described it is estimated that the storage life of lemons at 59° F. would be 40 weeks when held in an atmosphere containing 10% oxygen, 38 weeks in 5% O₂, 26 weeks in 2.5% O₂ and 18 weeks in air (20.9% O₂). The 5% and 10% O₂ atmospheres retarded yellowing, reduced respiration, and decreased decay by preventing button abscission. The addition of 5% or 10% CO₂ to 5% or 10% O₂ markedly retarded yellowing compared with O₂ alone but had little further effect on respiration. When ethylene was also added at 10 p.p.m. the respiration rate of lemons in air was doubled but only increased by 30% to 40% in atmospheres containing 5% O₂ and 5% or 10% CO₂. CO₂ counteracted rapid colour changes induced by ethylene.

803. KUROKAMI, T., AND SOGABE, T.
Studies with phytohormone treatments in controlling calyx abscission of summer oranges. III. Histological studies on the abscission layer in calyx of mature fruits of "Hassaku". [Japanese, with English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1953, 22: 65-71, bibl. 13, illus.

Calyx abscission in mature Hassaku summer oranges was delayed by 2,4-D treatment and accelerated by cold storage treatment (-1°C . to 1°C .), the abscission rates 90 days after treatment being 5.71% and 71% respectively compared with 46% in the control. [See also *H.A.*, 23: 2174.]

804. GRIERSON, W., AND NEWHALL, W. F.
Should gassing of Temples be banned?
Citrus Mag., 1953, 16 (2): 30-1, 35, bibl. 3, illus.

The investigation reported showed that the amount of a blackened peel breakdown of Temple oranges was related both to the concentration of ethylene used for degreening and the length of exposure to the gas. No breakdown was visible when the fruit was removed from degreening chambers but when held at 70°F . the injury soon began to appear and continued appearing for up to 20 days. When fruit was held under degreening room conditions but without ethylene no breakdown occurred, and this fruit also showed much less decay than did the ethylene-treated fruit.

805. BUREAU OF AGRICULTURAL ECONOMICS,
U.S. DEPARTMENT OF AGRICULTURE.
Consumers' use of and opinions about citrus products.

Agric. Inst. Bull. 50, 1951, pp. 167, 40 cents.
Products, viz. the fruit itself, its juice, canned citrus, etc., but not by-products. Figures are based largely on personal enquiries of householders.

Dates.

(See also 82.)

806. COOK, J. A., AND FURR, J. R.
Kinds and relative amounts of sugar and their relation to texture in some American-grown date varieties.
Proc. Amer. Soc. hort. Sci., 1953, 61: 286-92, bibl. 17.

Tree-ripe samples of 51 varieties of dates grown in the U.S.A. were stored for several months and analyzed for reducing sugars and total sugars. Sucrose was determined by difference. Thirty-four of the varieties were classified as soft, 9 as semi-dry, and 8 as dry. Though there were some striking exceptions, in general, the soft varieties contained little or no sucrose, the dry varieties contained relatively large amounts of sucrose and the semi-dry varieties were intermediate. The amounts of total sugars found in the different varieties varied from 68% to 85%. [Authors' summary.]

807. CIPOLLA, G.
"Bayoud": enfermedad de la palmera datilera. (The "bayoud" disease of the date palm.)
Idia, 1953, No. 61, pp. 1-4, illus.

Cases of "bayoud", a disease of date palms in North Africa, were observed in date palms in the La Rioja district of Argentina in 1948. The disease is a tracheomycosis due, in Argentina, to *Cylindrophora albedinis*.

808. LINDGREN, D. L., AND VINCENT, L. E.
Nitidulid beetles infesting California dates.
Hilgardia, 1953, 22: 97-118, bibl. 21, illus.

Life-history and thermal death point studies are reported on 4 nitidulid beetles which are apt to do serious direct and indirect damage to date fruits in the Coachella Valley, namely, *Carpophilus dimidiatus*, *C. hemipterus*, *Haptoncus luteolus* and *Urophorus humeralis*. In fumigation tests against eggs, larvae and adults on harvested dates ethylene dibromide was, in general, rather more effective than ethylene chlorobromide or methyl bromide. In trials with dusts applied 1 to 6, and preferably at least 3, weeks before the first picking the most effective materials appeared to be malathion, parathion and dieldrin; chlordane and lindane tended to impart an off-flavour. BHC, dieldrin and chlordane, at rates of $1\frac{1}{2}$ to 2 lb. per acre, dusted onto the soil and raked in, prevented a high percentage of beetles from emerging during a period that may be as long as 1 to 2 months.

Macadamias.

(See also 837.)

809. CURTIS, C. H.
The Queensland nut.
Gdnrs' Chron., 1953, 134: 130.

A short note on *Macadamia ternifolia* with particular reference to its cultivation in Hawaii, where research is now being devoted to it. A new technique is being developed for dealing with the hard shells.

810. STOREY, W. B., HAMILTON, R. A., AND
FUKUNAGA, E. T.
The relationship of nodal structure to training macadamia trees.
Proc. Amer. Soc. hort. Sci., 1953, 61: 317-23, bibl. 3, illus., being *Tech. Pap. Hawaii agric. Exp. Stat.* 266.

A method is described of training young macadamia trees in the orchard to overcome the inherent tendency of the trees to develop multiple leaders and to produce ascending lateral branches with sharp-angled, weak crotches. J.S.

Olives.

(See also 1, 19, 163, 164, 253, 323, 781, 832q, s.)

811. HARTMANN, H. T.
Olive production in California.
Manual Calif. agric. Exp. Stat. 7, 1953, pp. 59, bibl. 18, illus.

This well-illustrated booklet by the leading American authority on olives will be of interest to both growers and research workers beyond the confines of California. Professor Hartmann covers nearly every phase of olive production in 6 sections, the main contents of which are as follows: (1) The economic and historical background, with notes on the present importance of the crop and descriptions of the major varieties in California. (2) Choice of site, preparation of land and the planting and care of young trees. (3) The botany of the olive,

propagation by hardwood cuttings, softwood cuttings, detached suckers, grafting or budding and by top-grafting and notes on pruning and training and on fruit and vegetative growth phases. (4) Setting a satisfactory crop, with reference to such factors as temperature, irrigation, mineral nutrition, biennial bearing, thinning, pollination and delayed harvesting. (5) Production over a period of years as affected by manuring especially with N, K and B, irrigation, drainage, and such soil management practices as cover cropping, sod culture and clean cultivation, and notes on the harvesting of canning and oil olives and on low temperature injury to fruits. (6) Pests and diseases, their identification and control.

812. BÒTTARI, V., AND SPINA, P.

Le varietà di olivo coltivate in Sicilia.
(*The olive varieties cultivated in Sicily.*)

[English summaries 1, $\frac{1}{2}$ and $\frac{3}{4}$ pp.]

Ann. Sper. agrar., 1953, 7: 937-78, 1141-74, 1421-44, bibl. 27, illus.

This comprehensive and informative paper gives the results of a morpho-ecological study of the olive varieties grown in Sicily, conducted in 1947-52. The areas and varieties cultivated in the various olive-growing districts are listed and morphological, biometrical and bio-agronomic data are provided for 7 widely grown and 9 moderately widespread varieties, 12 of limited spread and 4 of more or less recent introduction. Notes are given on Sicilian production, table and oil varieties and their yields, and the ecological and disease-resistance (knot and leaf spot) characters and synonyms and homonyms of the different varieties.

813. GOOR, A.

Olive varieties in Israel. [Hebrew.]

Sifriath Hassadeh [1953?], pp. 32, bibl. 16, illus.

The local and introduced olive varieties described are of the pickling and oil types. Their requirements and their acclimatization in different zones of the country are discussed.

814. HAUVILLE, A.

L'olive "Sigoise". (*The Sigoise olive.*)

Fruits et Prim., 1953, 23: 226-30, bibl. 16, illus.

The olives of western North Africa belong almost entirely to the Zitoun variety (known in different localities as Picholine marocaine, olive de Tlemcen, Sigoise and olive du Tell). The Zitoun olive thrives in widely different soils and climates and is the basis of the most important preserved olive industry in North Africa and of the oil industry. It is being used in large planting programmes in Morocco and is the variety chiefly planted by the Algerian soil conservation service.

815. FRANCESCONI, F.

Sulla classificazione della varietà di olivo.
(*On the classification of olive varieties.*)

[English summary 7 lines.]

Ann. Sper. agrar., 1953, 7: 711-37, bibl. 27.

A statistical analysis of leaf, fruit, stone and kernel measurements in a number of olive varieties, including 3 specimens of the variety Moraiolo growing at 300, 500 and 700 m. respectively, showed that these do not

form a satisfactory basis for variety classification, since they can be similar in different varieties and different in the same variety at different elevations.—Ist. Colt. arb. Univ., Perugia.

816. SPINA, P.

Le caratteristiche del polline nella classificazione delle razze di olivo. (*Pollen characters in the classification of olive varieties.*) [English summary 10 lines.]

Ann. Sper. agrar., 1953, 7: 1003-13, bibl. 43, illus.

Investigations on 9 varieties showed that pollen characters are not a satisfactory means of classifying olive varieties.—Ist. Colt. arb., Univ. Firenze.

817. CALVINO, G. E. M.

Osservazioni sul polline dell'olivo e altri temi di studio. (*Notes on olive pollen and other subjects of study.*) [English summary $\frac{1}{2}$ p.]

Ann. Sper. agrar., 1953, 7: 853-62, bibl. 15, illus.

Notes are given on pollen studies on the Taggiasca and Ascolana varieties of *Olea europaea*. It is considered that the olive is both wind- and insect-pollinated.—Staz. sper. Floric., Sanremo.

818. MORETTINI, A., AND PULSELLI, A.

L'azione del vento nel trasporto del polline dell'olivo. (*Wind transportation of olive pollen.*) [English summary $\frac{3}{4}$ p.]

Ann. Sper. agrar., 1953, 7: 1187-1218, bibl. 24, illus.

Studies conducted in 1950-52 confirmed that cultivated olive varieties are wind-pollinated, bees taking no part, and led to the following conclusions: (1) pollen is transported in abundance for 12 km. and may therefore be assumed to be carried much farther; (2) the Caninese variety is self-sterile and its best pollinators are the varieties Olivone, Palmarino, Olivella selvatica, Crognolo and the wild olive.—Ist. Colt. arb., Univ. Firenze

819. MAZZOLANI, G.

De la influencia de alguna sustancia sobre la productividad del olivo. (*On the influence of cement dust on olive production.*)

Olivicoltura, 1953, No. 7, from abstr. in *Bol. Oleic. int.*, 1953, 3 (15): 96.

Experiments showed that cement dust hinders pollination if it falls on the ovary but does not affect the vegetative growth of the olive.

820. BOUAT, A., RENAUD, P., AND DULAC, J.

Étude sur la physiologie de la nutrition de l'olivier. (Deuxième mémoire.) (*The physiology of olive nutrition. Second communication.*)

Ann. agron. Sér. A, 1953, 4: 599-628, bibl. 6, illus.

A study was made of the variations during the course of the year in leaf content of dry matter, ash and mineral elements in the olive variety Arbequine. The conclusions were: (1) there is a continuous demand for N and P_2O_5 from growth flush to stone hardening; (2) stone hardening marks an important point in the annual cycle; (3) accumulation of N and P_2O_5 in the leaves occurs between stone hardening and the winter

period; (4) the younger the leaf the higher its N content in winter; (5) the minimum content of N and P_2O_5 at stone hardening is nearly as low as that at leaf fall; (6) the importance of the part played by the leaves in relation to fruiting increases with their age; (7) the leaves act as perennial storage organs but their constituent elements are partly renewed each year. [See also *H.A.*, 23: 2208.]

821. HARTMANN, H. T., AND BROWN, J. G.
The effect of certain mineral deficiencies on the growth, leaf appearance, and mineral content of young olive trees.

Hilgardia, 1953, 22: 119-30, bibl. 8, illus.

Plant growth, leaf analyses and leaf symptoms are recorded for young Mission olive trees grown for 2 years in sand cultures either with full nutrient or with K, Mg, P or N omitted. Absence of any one of these 4 elements resulted in a marked reduction in growth. With K deficiency growth reduction was accompanied by a steady decrease in leaf K but up to the end of the test no deficiency symptoms, similar to those seen in the field, had appeared. An inverse relation was found to exist between the leaf content of K and the leaf contents of both Ca and Mg. A direct linear relation existed between leaf contents of Ca and Mg. Withholding N caused a definite increase in the P content of the plants, but withholding P did not cause a corresponding increase in N content.

822. SITTON, G. R.
Harvest practices [for olives].
Calif. Agric., 1953, 7 (9): 4-5.

In 1952 harvesting costs of Sevillano olives in the Corning area of California ranged from \$54 to \$82 per ton. Of these costs 83% was for picking and 17% for supervision and haulage. The survey showed careful timing of picking to be of paramount importance. Picking just before the fruit started to colour caused losses of 25% to 45% in potential tonnage and even greater losses in potential gross income. Harvesting too late caused comparable losses due to shrivelling caused by frost or cold winds. The average net labour requirement for picking was found to be 0.94 man-hour per 40-lb. box. Size and grade losses after picking could be reduced by carrying out weighing, grading and storage in brine as quickly as possible.

823. LYCNOS, D.
Resistenza relativa di alcune varietà di olive all'attacco del "*Dacus*". (The relative resistance of some [Greek] olive varieties to *Dacus* attack.)

Feuilles Inf. oléic. int., 1952, No. 2/3: 1052-9, from abstr. in *Olearia*, 1953, 7: 163.

The author considers that in Greece the early, large-fruited varieties of olive are not always development foci of *Dacus oleae* as some workers have maintained, but that the small-fruited late varieties which are not considered susceptible to attack are nevertheless sometimes to be preferred for plantations. Of 8 local varieties classified according to their resistance the most resistant is the early, large-fruited Chondrolia of Corfu. In a test at Patrasso Agricultural School the late, small-fruited variety-group Koronéique was the most susceptible, the moderately early, large-fruited

Aetonycholia was intermediate and the Lodolia variety-group with medium-sized fruit was the most resistant. In addition to earliness and size of mesocarp the moisture content at the moment of egg-laying can be an important factor in resistance.

824. PERETZ, I., AND TEICH, Y.
An experiment to control olive fly by combined treatments. [Hebrew.]
Hassadeh, 1953, 33: 296-8.

Experiments were carried out on the control of olive fly on three varieties of olive using (1) methoxychlor (50%) at 0.5% concentration, (2) DDT (50%) at 0.5% concentration, (3) dieldrin (25%) at 0.3% concentration. Molasses (2%) was added to each spray as a bait. Considerable control was achieved with all sprays, but the proportion of scorched fruit was higher than in the controls. The protective action of molasses is emphasized, but its effect without the sprays was not determined. The experiment lasted only one year and needs to be repeated. [See also *H.A.*, 23: 4554.]
H.C.R.

825. RUSSO, G., AND SANTORO, D.
Esperimenti di lotta antidiaca eseguiti in Ascea Marina (Salerno) nel 1951. (Olive fly control experiments at Ascea Marina (Salerno) in 1951.)
From abstr. in *Olearia*, 1953, 7: 107-8.

In experiments on the control of *Dacus oleae* the insecticides under test were applied 4 times (except the phosphoric esters) at intervals depending on the development of the fly. DDT, BHC and the phosphoric esters were efficacious but the other materials, including the Berlese mixture, did not give satisfactory results.

826. GIRALDI, G.
Osservazioni preliminari sulla *Dasyneura* (*Perrisia*) *oleae* Low nel Veronese. (Preliminary notes on *Dasyneura oleae* in Verona province.) [English summary 6 lines.]
Ann. Sper. agrar., 1953, 7: 827-36, bibl. 9, illus.

The olive leaf midge, *Dasyneura oleae*, is becoming important in Verona. It causes galls on the buds and young shoots, which, when the attacks are intensive, may lead to flower drop, decline, dieback and defoliation. It prefers the imported Tuscan varieties, Leccino, Moraiolo, Frantoio and Ascolana to the Veronese varieties, and of the latter it prefers Favaro to the harder Grignan, Casaliva and Compostar. Effective means of control are lacking. The employment of hardy varieties and of any measure that will keep the trees in good health is to be recommended.—Osserv. fitopat. Veneto, Verona.

827. DOUTT, R. L.
Natural enemies of olive scale.
Calif. Agric., 1953, 7 (10): 5.

The release of 7 introduced natural enemies, notably the Persian *Aphytis* sp., have reduced populations of the olive scale, *Parlatoria oleae*, in some Californian orchards by 90% to 98.6%, but it is still too early to judge if these and other imported parasites and predators will achieve and sustain commercial control.

Passion fruit.

828. BOWERS, F. A. I.

Passion fruit tests show promise.*Hawaii Fm Sci.*, 1953, 2 (2): 3, 6, 8.

Three types of passion fruit, purple (*Passiflora edulis*), yellow (*P. e. flavicarpa*) and an intermediate form were subjected to 3 methods of pruning: nil, 'light pruning and heavy pruning (cut to 4 ft. from the ground). Under conditions of strong winds recovery of the heavily pruned vines was poor. Tests have also shown marked variability in seedlings from the same fruit as regards fruit colour, aroma, flavour and yield of juice.

829. McKNIGHT, T.

The woodiness virus of the passion vine (*Passiflora edulis* Sims).*Qd J. agric. Sci.*, 1953, 10: 4-35, bibl. 10, illus.

Studies are reported on the epiphytology, symptomatology and transmissibility of the woodiness virus. Initial infections of new plantings are commonly highest in areas adjacent to a diseased source, but in unpruned plantations there is no significant difference between the infection rate near a previously healthy vine and that near a diseased vine. Descriptions are given of 13 distinct symptoms associated with the virus. Seasonal variations in symptom expression have been observed. The virus can be transmitted by aphids, though the known aphid vectors do not colonize the passion vine by choice. The virus is readily transmitted by various mechanical means including the use of secateurs. The time taken for the expression of the first symptoms in infected seedlings is governed by temperature. In cross-inoculation tests on other species of *Passiflora* attempts to infect, or to recover the virus from, *P. suberosa* failed, but *P. edulis* f. *flavicarpa*, *P. foetida* and *P. alba* proved susceptible. *P. alba*, a common wild plant in parts of Queensland, is considered to be an important natural reservoir of infection. Finally, evidence is presented which suggests that the woodiness virus as it occurs in Australia exists as a complex of strains and is not a single entity, as previously thought.

Tung.

(See also 10, 835, 1045, 1055.)

830. O'ROURKE, E. N., JR., AND NEFF, M. S.

Effect of nitrogen, potassium and magnesium on the growth of non-bearing tung trees on Lakeland fine sand.*Proc. Amer. Soc. hort. Sci.*, 1953, 61: 56-62, bibl. 3.

Three levels each of K and Mg and two levels of N were used in an experiment on newly-planted, seedling tung trees in Florida. Serious deficiencies of both K and Mg existed when these nutrients were not applied but were partially corrected by the doses given. Correction of K deficiency was associated with a major growth response, but little if any growth improvement was effected by the Mg applied. N appeared to be adequate at the lower level, but at a higher level colour of the leaves was somewhat darker and there was a small improvement in growth. Under local conditions the most satisfactory growth is likely to be obtained when

both K and Mg are applied in combination with a moderate level of N. J.S.

831. SHEAR, C. B.

Zinc in relation to cold injury to tung.*Proc. Amer. Soc. hort. Sci.*, 1953, 61: 63-7, bibl. 7.

In a nutritional experiment at Gainesville, Florida, 1-year-old tung trees having received different sources of N and levels of K and Zn were subjected to a temperature of 18° F. while still in leaf in November 1950. Trees which had received high Zn withstood the freeze much better than those that had received low Zn. The greatest resistance to cold was attained by trees receiving both high Zn and high K. Levels of Zn in the leaves sufficient to prevent Zn-deficiency symptoms (more than 0.15 me/100 g. (49 p.p.m.)) were not effective in producing cold resistance. Maximum cold resistance was not attained unless levels of Zn in the leaves were above 0.60 me/100 g. (196 p.p.m.) and these levels of leaf Zn were effective only when K in the leaves was above approximately 30 me/100 g. [From author's summary.]

Noted.

832.

a BEN-MEIR, Y.

Fungi isolated from the air of groves and packing sheds and from the skin of Shamouti oranges. [Hebrew, with abridged English translation 3 pp.]*Ktavim*, 1952, 2/3, Hebrew pp. 135-40, English pp. 35-7.

b BROWN, C. P.

The development of citrus cultivation in Egypt.*World Crops*, 1953, 5: 442-4, illus.

c CHAPOT, H.

L'agrumiculture au Liban et en Syrie. (Citrus growing in Lebanon and Syria.) *Fruits d'Outre Mer*, 1953, 8: 393-402, illus.

d COIT, J. E.

The carob in California.*Yearb. Calif. Avoc. Soc. for 1952*, pp. 41-8, illus.

Notes on history and on a demonstration orchard.

e DAVISON, J. R.

Trifoliata—comments on its behaviour and handling as a citrus root stock on the Murumbidgee Irrigation Area.*Agric. Gaz. N.S.W.*, 1953, 64: 358-61, illus.

f EBELING, W., AND PENCE, R. J.

Pests of the avocado.*Yearb. Calif. Avoc. Soc. for 1952*, pp. 113-33, illus.See also *H.A.*, 23: 4493.

g GILLESPIE, H. L.

Asexual reproduction of rootstock from heavy-producing Fuerte avocado trees.*Yearb. Calif. Avoc. Soc. for 1952*, pp. 97-101.See *H.A.*, 23: 1098.

- h ISAACIDÈS, C.
La lotta contro la mosca delle olive in Grecia. (Olive fly control in Greece.) *Feuilles Inf. oléic. int.*, 1952, 12 (4): 168-72, from abstr. in *Olearia*, 1953, 7: 108-9. Chemical and biological control of *Dacus oleae*.
- i JONES, W. W., AND CREE, C. B.
Fertilizer placement [for citrus]. *Calif. Agric.*, 1953, 7 (9): 5. See *H.A.*, 23: 4512.
- j KIRCHNER, J. G., AND MILLER, J. M.
Citrus flavoring. Volatile oil constituents of grapefruit juice. *J. agric. Food Chem.*, 1953, 1: 512-18, bibl. 7. Includes data on constituents of fresh juice.
- k KIRCHNER, J. G., AND OTHERS.
Citrus flavoring. Volatile water-soluble constituents of grapefruit juice. *J. agric. Food Chem.*, 1953, 1: 510-12, bibl. 7. Includes data on constituents of fresh juice.
- l LITTAUER, F., AND NADEL-SCHIFFMANN, M.
Incubation period and development stages of citrus fruit mould. [Hebrew, with abridged English translation 1½ pp.] *Ktavim*, 1952, 2/3, Hebrew pp. 123-7, bibl. 5, English pp. 31-2. Temperature responses of *Penicillium italicum* and *P. digitatum*.
- m MAYMONE, B., AND BATTAGLINI, A.
Ricerche sulla digeribilità e sul valore nutritivo dei semi di carrubo (*Ceratonía siliqua* L.) (Research on the digestibility and nutritive value of carob (*Ceratonía siliqua*) seed.) [English summary 14 lines.] *Ann. Sper. agrar.*, 1953, 7: 1367-75, bibl. 5, illus.
- n MEYL, A. H.
Über das Vorkommen von Nematoden in faulenden Zitronen und das Auftreten männlicher Individuen von *Aphelenchus avenae* Bast. (On the incidence of nematodes in rotting lemons and the occurrence of male individuals of *Aphelenchus avenae*.) *NachrBl. dtsh. PflSchDienst.*, Braun-schweig, 1953, 5: 153-4, bibl. 4, illus.
- o MILLERD, A., BONNER, J., AND BIALE, J. B.
The climacteric rise in fruit respiration as controlled by phosphorylative coupling. *Plant Physiol.*, 1953, 28: 521-31, bibl. 11. Avocado was the fruit studied.
- p MINZ, G., AND GUTTER, Y.
Post-war survey of diseases in Shamouti orange groves [in Israel]. [Hebrew, with abridged English translation 2 pp.] *Ktavim*, 1952, 2/3, Hebrew pp. 129-34, bibl. 2, English pp. 33-4.
- q NÈGRE, E.
Quelques données nouvelles sur la conservation des olives vertes. (Some new facts on the preservation of green olives.) *Progr. agric. vitic.*, 1953, 140: 199-202. Hints on manipulation during brine immersion.
- r RUSSO, F.
Una pregevole mutazione vegetativa del "Sanguinello Moscato": l'arancio "Moscato Cuscunà". (A valuable vegetative mutation of Sanguinello Moscato, the Moscato Cuscunà orange.) [English summary ½ p.] *Ann. Sper. agrar.*, 1953, 7: 907-13, bibl. 11, illus. Grown in Sicily.
- s SPINA, P., AND BÒTTARI, V.
Autofertilità e autosterilità delle varietà di olivo coltivate nella Sicilia settentrionale e centro-orientale e ricerca delle relative impollinatrici. (Biennio 1950-1951.) (Self-fertility and self-sterility in the olive varieties cultivated in northern and east-central Sicily and an investigation of pollinators, 1950 and 1951.) [English summary ½ p.] *Ann. Sper. agrar.*, 1953, 7: 915-35, bibl. 11, illus.
- t VOLCANI, R.
Orange peel and whole orange fruit as feed for dairy cows. [Hebrew, with abridged English translation 2½ pp.] *Ktavim*, 1952, 2/3, Hebrew pp. 93-107, bibl. 5, English pp. 23-5.
- u WALLACE, J. M., AND DRAKE, R. J.
Vein enation in citrus leaves. *Calif. Agric.*, 1953, 7 (9): 6, illus. For another account see *H.A.*, 23: 3449.
- v WINSLOW, M. M.
Avocados in Brazil. *Yearb. Calif. Avoc. Soc. for 1952*, p. 145. Varieties, cultivation, and pests and diseases.
- w WINSLOW, M. M.
The Ryan avocado. *Citrus Leaves*, 1953, 33 (8): 22. Its characters and behaviour at Riverside, Calif.
- x ZENTMYER, G. A.
Research on avocado root rot. *Yearb. Calif. Avoc. Soc. for 1952*, pp. 103-6. Investigations on *Phytophthora cinnamomi* summarized.
- y ZENTMYER, G. A.
Resistance to *Phytophthora* root rot of avocado. From abstr. in *Phytopathology*, 1953, 43: 490. The search for a rootstock resistant to *P. cinnamomi*.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(See also 10, 454, 1033, 1061b, o, p, q.)

833. CEYLON (JOACHIM, A. W. R.).

Administration Report of the Director of Agriculture for 1952, Part IV—Education, Science and Art (C), 1953, pp. 138, Rs. 2.75.

Tea Research Institute: blister blight control; green manure, cover crop and herbicide trials; fish leaf plucking experiment; Guatemala grass manurial experiment. *Rubber Research Institute*: oidium control; *Fomes lignosus* root disease investigations; breeding; yield stimulant and rainguard experiments; technical classification of rubber; manurial and mineral deficiency studies; planting density trial. *Coconut Research Institute*: manuring; breeding; grazing trials. *Sugar cane*: time of planting; spacing; fertilizer and variety trials. *Entomology*: chilli leafcurl; cabbage pests; biological control of *Nephantis serinopa*. *Pathology*: cacao leafcurl. *Horticulture*: Cacao selection, pollen and fermentation studies, seed viability; citrus stockscion trials and seed viability, indigenous lime improvement; pepper; pineapple; introduced fruit. *Tobacco*: trace element, economics, rotation and variety trials, and various trials on cigarette and Bidi tobaccos in the Jaffna peninsula.

834. I.N.E.A.C.

Rapport annuel pour l'exercice, 1952. (Report of the work of the I.N.E.A.C. Stations, 1952.)

Institut national pour l'étude agronomique du Congo belge, Brussels, 1953, pp. 395, 160 fr.

The volume includes reports from Yangambi research station and various substations. The Yangambi report covers the following subjects. *Oil palm*: breeding, cultural experiments (plantation clearance, maintenance and replanting). *Hevea*: selection, cultural experiments (spacing, thinning, effect of climate on grafting, stockscion effects, tapping systems), disease control. *Coffee*: breeding, cultural experiments (training, shading, fertilization, propagation by cuttings), disease and pest control. *Cacao*: biology and ecology, breeding, cultural experiments (clearance, maintenance, shading). *Food Plant Division*: banana, citrus, *Abroma augusta*. *Phytopathology and Entomology Division*: pests and diseases of coffee, cacao, oil palm, rubber, citrus, pyrethrum and tobacco. *Plant Physiology Division*: mineral nutrition of oil palms and robusta coffee, growth rate in juvenile oil palms.

835. SOYER, L.

L'activité de l'Inéac dans les territoires du Ruanda-Urundi en 1952. (The activities of INEAC in Ruanda-Urundi in 1952.)

Bull. Inf. INEAC, 1953, 2: 209-41, illus.

Among the research projects carried on by I.N.E.A.C. in Ruanda-Urundi in 1952 were the development of subsistence crops (including banana and the oil plants, *Carthamus*, *Guzotia*, *Pentadesma*, *Carapa*, avocado and *Elaeis guineensis*), and of industrial crops (coffee, quinine, pyrethrum, fibre plants, castor and *Aleurites*).

836. JAMAICA.

Department of Agriculture, Jamaica. Investigations 1952.

Bull. Dep. Agric. Jamaica 50, 1953, pp. 122, 2s.

Economic Entomology. Pests of sugar cane, tomato, pineapple, citrus, melon, cabbage and stored ginger; host plants of *Heterodera marioni*; new insecticides; biological control (supply to growers of *Plaesus javanus* attacking *Cosmopolites sordidus* on banana, *Dasyscaphus parvipennis* attacking *Selenothrips rubrocinctus* on mango and other plants, and *Eretmocerus serius* attacking *Aleurocanthus woglumi* on citrus). *Field crops*. Sisal, *Agave fourcroydes*, *Furcraea gigantea*, castor, sugar cane moth borer (*Diatraea saccharalis*) survey. *Plant pathology*. Sugar cane, tomato, cacao and pineapple diseases. *Cultivated trees, shrubs and vines*. Banana breeding, propagation and management; cacao introduction, propagation and variety trials; cashew selection; citrus propagation and management; coconut spacing, cultivation and manuring; coffee selection; ginger fertilization trials; geranium oil (*Pelargonium limonum*) and peppermint oil (*Mentha piperita*) investigations; *Elaeis* introduction and variety tests; pineapple introduction, variety and canning tests; tomato fertilizer trials.

837. BARRAU, J.

Research in Queensland on tropical plant and animal industries.

Tech. Pap. S. Pacific Commiss. 43, 1953, pp. 72, illus., 2s.

An account is given of research on tropical plant industries in Queensland from the point of view of its possible application in the economic development of the Pacific Islands. Brief notes are given on the climate and soils of Queensland, the organization of agricultural research, castor, fruits (pineapple, banana, citrus, papaw, macadamia, avocado, mango, passion fruit), vegetables, coffee, tea, sugar cane, tobacco, pepper, ginger, and on the control of pests, diseases and weeds. Ample references are given in the text for those who want to study particular crops more closely.

838. IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

Report of the Governing Body and the Acting Principal's Report for the period 1st October 1950 to 30th September 1952, 1953, St. Augustine, Trinidad, and 40 Norfolk Street, London, W.C.2, pp. 48.

This report includes short accounts of the research schemes administered by the College. Separate abstracts are given of those on bananas and sugar. The cacao research scheme is also covered briefly [for a much more detailed report see abstract 1024 and several abstracts in the Cacao section].

839. TRINIDAD AND TOBAGO.

Administration Report of the Director of Agriculture, Trinidad and Tobago, for 1951, 1953, pp. 47, 60 c.

Cacao: clonal propagation. *Sugar cane*: pre-emergence weed control with 2,4-D; trial of cane from untreated and hot-water-treated chlorotic streak-infected setts.

Citrus: lime epidemic dieback—causal studies, Dominica wild grapefruit the outstanding rootstock for budded limes; lime withertip control experiments; citrus rootstock and management trial; grapefruit manurial trials; cover crop trials. *Coconut*: experimental control of red squirrel (*Sciurus aestuans*) with warfarin.

840. TERRA, G. J. A.

Some ecological requirements of Indonesian fruit trees. [Indonesian summary $\frac{1}{3}$ p.]

Landbouw, 1952, 24: 193-222, bibl. 18, illus.

Some factors affecting the growth of fruit trees in the tropics are discussed, and notes and tables are given on the requirements and distribution of a large number of Indonesian trees, including *Aleurites*, *Annona*, *Artocarpus*, *Carica*, *Cinchona*, *Citrus*, *Cocos*, *Diospyros*, *Durio*, *Eugenia*, *Mangifera*, *Musa*, *Psidium*, *Theobroma* and *Zizyphus*. Mention is also made of the behaviour of a wide variety of imported fruit trees and plants.

841. COLONIAL PRODUCTS ADVISORY BUREAU (VARIOUS AUTHORS).

Reports of recent investigations at the Colonial Products Advisory Bureau.

Colon. Plant Anim. Prod., 1952/3, 3: 214-48.

Reports are given on the following among other products. Tea from Malaya, *Licania venosa* [oil] seeds from British Guiana, Candlenut oil [from *Aleurites moluccana*] from Malaya, *Parkia filicoidea* pods [as a source of tannin] from Nigeria, gum arabic [from *Acacia senegal*] from Somaliland.

842. COLONIAL PRODUCTS ADVISORY BUREAU (VARIOUS AUTHORS).

Notes.

Colon. Plant Anim. Prod., 1952/3, 3: 248-58, bibls.

Useful notes concern among other subjects the following: By-products of citrus for stock feed; the use of Zanzibar cloves in cigarettes in the Far East; the Caesalpinias as tanning materials; the production of lime oil and lime juice; the stabilization of papain during storage.

843. RAO, V. T., AND RAO, K. R. N.

The role of BHC (benzene hexachloride) in the control of the red tree ant—*Oecophylla smaragdina* Fabr.

S. Indian Hort., 1953, 1: 67-71, bibl. 15.

Experiments in the control of the red tree ant, *Oecophylla smaragdina*, an attendant on scale insects and mealybugs, with BHC and other insecticides were conducted at Coimbatore and Kallar in 1950-52 on various tropical fruit trees. 5% BHC dust (0.65% gamma) and 0.025% sprays gave good control in 6-24 hours. The nests were pierced with a knife before dusting, and in spraying the fluid was directed into the nest in a jet. The residual effect lasted 3-4 weeks.

844. TANADA, A. F., MATSUMOTO, H., AND SCHEUER, P. J.

Bromide residues; determination in fresh fruits after fumigation with ethylene dibromide.

J. agric. Food Chem., 1953, 1: 453-5, bibl. 9.

A method is described for the determination of ethylene

dibromide and bromide residues in fresh fruits and vegetables which were fumigated with ethylene dibromide. Papaya and pineapple flesh showed no increase in ethylene dibromide or bromide content six days after fumigation. Avocado flesh retained 7.3 p.p.m. of ethylene dibromide and 5.5 p.p.m. of bromide. Banana flesh retained no ethylene dibromide, but an excess of 28 p.p.m. of bromide. [Authors' summary.]

Bananas.

(See also 835, 836, 837, 840, 844, 1017q, r, 1025.)

845. I.C.T.A.

Research Schemes. Bananas.

A.R. imp. Coll. trop. Agric., Trinidad, 1950-52 1953, pp. 28-30.

"The primary object of the scheme was to combat panama disease of the Gros Michel banana by the combination of pathological and plant breeding techniques. As time has gone on, it has become evident that control of leaf spot is, for Jamaica, at least as important as control of panama disease in consequence of the recent adoption in that island of Lacatan as an export variety. There is virtually no hope of achieving an effective practical control of panama disease, and while leaf spot can be effectively controlled by spraying, the process is extremely expensive and becoming more so year by year; hence, plant breeding offers by far the better chance of achieving useful practical results." Notes are given on the breeding programme.

846. FAHN, A.

The origin of the banana inflorescence.

Kew Bull., 1953, No. 3, pp. 299-306, bibl. 8.

The work was carried out in the Jodrell Laboratory at Kew. It concerned the development of the primordia of flowers in the flower-groups in the dwarf Cavendish banana, in *Musa acuminata* Colla., and in *M. balbisiana* Colla. and also the development of the vascular bundles in the cushion and flowers.

847. SIMMONDS, N. W.

Notes on the banana bunch.

Trop. Agriculture, Trin., 1953, 30: 54-9, bibl. 3.

The relations between numbers of hands and numbers of fruits and between numbers of hands and the count percentage in the Gros Michel banana are defined by means of regression equations. [Author's summary.]

848. MONNET, J.

La protection vivante du sol des bananeraies en Guinée française. (Cover crops in banana plantations in French Guinea.)

Fruits d'Outre Mer, 1953, 8: 343-53, bibl. 7.

Experiments were conducted to determine whether the production costs of dwarf bananas (*Musa sinensis*) could be reduced, while maintaining soil fertility, by the use of leguminous cover crops instead of by grass mulching with indigenous species such as *Rottboellia exaltata*, which, though efficacious, is expensive. The cover crops, of which 8 were tested, not only reduced the banana yield but, in general, were also difficult to establish and maintain.—Stat. centr., I.F.A.C., Guinée.

849. BRUN, J., AND CHAMPION, J.
Le "bleu" du bananier en Guinée française.
(The "blue" disease of bananas in French
Guinea.)
Fruits d'Outre Mer, 1953, 8: 266-9, bibl. 1,
illus.

Field experiments showed that Mg has a curative effect on this disorder [see *H.A.*, 23: 1239]. The recommended rate of application of magnesian limestone, which is slow-acting, is a maximum of 1 kg. per plant for curative, and 30 g. for preventive, purposes. The K: Mg ratio is of fundamental importance and on Mg-poor soils no K should be applied without Mg.—Stat. centr. I.F.A.C., Guinée.

850. WAITE, B. H., AND DUNLAP, V. C.
Preliminary host range studies with *Fusarium oxysporum* f. *cubense*.

Plant Dis. Reptr., 1953, 37: 79-80, bibl. 3.

Three species of grass and a low-growing herb collected from banana farms on which panama disease was prevalent showed definite association with the fungus.

851. STOVER, R. H.
The effect of soil moisture on the growth and survival of *Fusarium oxysporum* f. *cubense* in the laboratory.

Phytopathology, 1953, 43: 499-504, bibl. 8.

The effect of soil moisture on the growth and survival of *Fusarium oxysporum* f. *cubense* in soil was studied. In non-sterile soils and under the conditions of these experiments 25% saturation was optimum for growth and survival. [From author's summary.]—United Fruit Co., La Lima, Honduras.

852. PURSS, G. S.
A disease in Williams Hybrid bananas produced by *Fusarium* sp.

Qd J. agric. Sci., 1953, 10: 126.

A species of *Fusarium* differing from *F. oxysporum* f. *cubense* was isolated from plants of a Cavendish sport, called Williams Hybrid, which showed symptoms similar to those of panama disease. The *Fusarium* sp. proved capable of attacking Williams Hybrid and Lady Finger but not Cavendish, whereas *F. oxysporum* f. *cubense* only infected Lady Finger. The disease has not yet recurred in the field.

Cacao.

(See also 834, 839, 1016b, d, s, w, 1017k, 1024, 1030.)

853. BAREAU, P.
Cocoa, a crop with a future.

Cadbury Bros. Ltd., Bournville, England,
1953, pp. 39, 9½ × 7 in., illus., 7s. 6d.

Since 1940 there has been a large gap between the world demand for cocoa and the supply. The expansion of demand has been sufficient to cause the dollar price of the commodity to rise by nearly 600% compared with pre-war values and the sterling price to rise by 750%. The continued maintenance of such high prices may jeopardize the industry, because manufacturers are already looking for substitutes or alternatives. The answer lies in increased production, but this requires confidence on the part of producers that the potential demand for cocoa is such that a substantial expansion in output can be absorbed without unduly depressing

prices. In this simply written and lavishly illustrated booklet, prepared on behalf of Messrs. Cadbury Brothers Ltd., Mr. Bareau sketches the main outlines of the present cocoa position and reaches conclusions similar to those of the more comprehensive but less readable survey by F.A.O. [see *H.A.*, 23: 1244]. What these conclusions are may be judged from the title.

854. WEST AFRICAN CACAO RESEARCH INSTITUTE (W.A.C.R.I.).

Annual Report West African Cacao Research Institute, 1950/51, Tafo, 1953, pp. 63, 5s.

Virus Research. New cacao swollen shoot virus strains, virus 1A, alternative host plants, chemotherapy. *Capsid Research*. General, chemical control. *Chemistry*. Fermentation, bean composition, black pod bean chemistry, tannins. *Soil Science*. Soilless culture, P fertilization. *Botanical Studies*. Breeding, vegetative propagation (cuttings), interspecific grafts. *Mycology*. Pod disease. *Mealybug Studies*. Biological and chemical control. *Arboricides*. *Agronomy*. Uniformity, establishment, spacing, thinning, and transplanting experiments.

855. WEST AFRICAN CACAO RESEARCH INSTITUTE (W.A.C.R.I.).

Annual Report West African Cacao Research Institute, 1951/52, Tafo, 1953, pp. 54, 5s.

Virus Research. New cacao swollen shoot virus strains, virus 1A complex, mechanical transmission, chemotherapy, alternative hosts. *Capsid Research*. Insecticide trial area (macromischoides plot), [remote] forest reserve cacao plots, chemical control, DDT dusts and cacao pollination. *Soil Science*. Soilless culture, effect of P on bearing cacao, performance on different soil types. *Chemistry*. Laboratory fermentations and assessment of quality, black pod bean chemistry, *Herrania* spp., cacao pulp, problems relating to viruses. *Horticulture and Plant Breeding*. Vegetative propagation, physiology, breeding. *Mycology*. Pod disease, systemic fungicides. *Mealybug Studies*. Populations, attendant ants, biological control, chemical control. *Arboricides*. *Agronomy*. Uniformity, establishment, spacing, thinning, transplanting and fermentation experiments.

856. WEST AFRICAN CACAO RESEARCH INSTITUTE (W.A.C.R.I.).

Annual Report West African Cacao Research Institute, 1952/53, Tafo, 1953, pp. 39, 5s.

Virus Research. Cacao swollen shoot virus (CSSV): strains, host range, environmental studies, mechanical transmission, transmission by *Pseudococcus njalensis*, virus persistence in starved vector, search for new vectors, artificial feeding of vectors. *Capsid Research*. Insecticide trials, regeneration of capsid pockets, chemical control (DDT dusts and cacao pollination, application to higher trees, dusting tests). *Soil Science*. Effect of P on bearing cacao. *Chemistry*. Problems relating to CSSV, analysis of insect secretions, bean analysis for chlorogenic acid, fermentation and flavour assessment, factors affecting variation in bean constituents. *Plant Physiology and Horticulture*. Vegetative propagation (2-leaf stem cuttings give larger root systems and quicker outgrowth of the axillary bud than

1-leaf; clone nursery); physiological investigations (role of leaf in the rooting of 1-leaf cuttings, cambial tissue culture). *Plant Breeding. Mycology.* Black pod disease (*Phytophthora palmivora*): air-borne dissemination, dry season survival. *Mealybug studies.* Collections, biological control (indigenous and exotic parasites), parasite-host tests, ant-attractant tests, ground migration, systemic insecticides. *Agronomy.* Transplanting experiments, yield and growth studies.

857. HARDY, F.

The productivity of cacao soils and its improvement.

Trop. Agriculture, Trin., 1953, 30: 135-8, bibl. 6.

The deterioration of cacao soils in Trinidad.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 83-8, bibl. 3, illus.

In the first paper a brief summary is given of some of the results and conclusions so far reached by the Chemical and Ecological Section of the Cacao Research Scheme, Imperial College of Tropical Agriculture, Trinidad. It is concluded that the chief cause of the decline in productivity of the cacao soils of Trinidad is the slow deterioration of their organic matter component comprising the uppermost humic layer of the soil profile. This results in a decline in C/N ratio which affects the activities of mycorrhiza and other soil flora and fauna, and also accentuates the leaching of mineral nutrients, notably phosphates.

The second paper covers the same ground, but in greater detail.

858. RICHARDS, A. V.

Progress of selection work on cacao.

Trop. Agriculturist, 1953, 109: 19-25, bibl. 2, illus.

Local selections and imported material are under investigation in Ceylon with the object of obtaining healthy clones yielding over 1 ton of cured cocoa per acre and with pod values of not more than 7½. In studies on pollen compatibility one high-yielding local selection, No. 46, proved self-compatible, whereas others were self-incompatible and two proved cross-incompatible. Bulk fermentation followed by washing gave a product of good quality with an average loss of weight on curing of 63%. Attempts to ferment small samples resulted in under-fermented and slaty beans.

859. COPE, F. W.

Some results of the cacao clonal trials at River Estate.

Rep. Cacao Res. Imp. Coll. trop. Agric. 1945-1951, 1953, pp. 12-23, bibl. 13.

The results to 1950/51 are reported of 9 trials ranging from 3 to 13 years old which involved various comparisons of clones, trees raised from fans vs trees raised from chupons, and trees raised from cuttings vs trees raised by budding. Yields are expressed as dry cacao from healthy pods. Of the 44 clones compared, 13 have yielded well or give promise, from early crops, of doing so, 3 are considered likely to yield well in some circumstances, 4 yielded poorly in the early stages but have shown promise of heavy yielding with maturity, and 16 have yielded poorly. The relative merits of fan and chupon growths have remained undetermined; it is possible that some clones may be more efficient as fan

growths and others as chupons. Cuttings generally outyielded buddings in the group of good clones, but with maturity differences became less marked. Among poor clones buddings were often more efficient than cuttings, and among the group showing late promise buddings characteristically outyielded cuttings. In one of these trials pen manure plus inorganic fertilizers, and in a second trial cut bush mulch plus inorganic fertilizers, gave significant yield increases over no manuring. In one trial spraying with a 0.3% solution of Hortomone A at 2 gal. per tree tended to reduce yields in the season following application but to increase them in subsequent seasons; this result cannot, however, be regarded as conclusive. Three further experiments have been started.

860. JOLLY, A. L.

Notes on the performance of ICS clones at San Juan Estate.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 26-8.

A pod-counting system, used to calculate the yields of 2 fields, consists of counting all pods that are likely to mature within 3 months and marking the smallest of them on each tree; the count is repeated 3 months later and all pods larger than the one previously marked are not counted again. Yields of dry cacao are calculated from sample pod weighings and seed extractions. Though less accurate than full tree records the system has the merit of being inexpensive and possible to apply to commercial estates without interfering with ordinary management. On this basis clones are divided into 3 groups, 25 classed as good (over 2.81 lb. dry cacao per tree per annum), 24 as intermediate (2.81-1.43 lb.) and 33 as poor (under 1.43 lb.). The analysis also demonstrates the uniformity of clonal material obtained from cuttings as compared with clonal seedlings.

861. EVANS, H.

Recent investigations on the propagation of cacao.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 29-37, bibl. 2, illus.

A concise summary is given of the more important results of numerous investigations on the vegetative propagation of cacao undertaken in Trinidad since 1945 [for earlier accounts of much of this work see *H.A.*, 21: 1026, 22: 4322 and 23: 1246]. Four aspects are considered: I. *Factors involved in propagation from cuttings.* These include such factors as the time of day for taking cuttings, effects of treatment with hormones, the role of the leaf in rooting, the effects of nutritional differences between clones on the rooting facility of those clones, nursery management for the production of cutting material, the maintenance of optimal external factors during the rooting process (light intensity, temperature and relative humidity of the air, and rooting media and their air-moisture relations), practical methods of propagation by cuttings, the type of cutting, and the composition of the potting mixture and hardening technique for rooted cuttings. II. *Factors involved in the rooting of Theobroma spp. other than T. cacao.* Preliminary experiments are reported on species of *Theobroma* that do not root so readily as *T. cacao*. These included interspecific leaf and bark grafts, treatment with hormones and injected nutrients and localized treatment of the base of the stem. Rooted

plants, but generally a low percentage, have been produced of all the *Theobroma* spp. tested and also of cloves, and certain of the factors involved and not involved in rooting have been clarified. III. *Studies on the possibility of inducing part or the whole of the rooting process in shoots prior to removal from the tree.* No treatments applied to shoots before their removal as cuttings accelerated rooting, but a new marcotting technique superior to that employed previously was evolved. This is described in detail with the aid of diagrams. IV. *Budding and grafting techniques.* Various satisfactory techniques have been evolved, including a method of patch budding onto chupons of old trees, a highly successful method of bench grafting and a method of wedge grafting seedlings.

862. RUSSELL, T. A.

The spacing of Nigerian cacao.

Emp. J. exp. Agric., 1953, 21: 145-53, bibl. 4.

From the results of two spacing trials and from records made on farmers' cacao planted at different spacings it is concluded that, under prevailing conditions in the Ibadan district of Nigeria, close spacing of West African Amelonado trees at $6\frac{1}{2}$ to 8 ft. apart (800 to 1,100 trees per acre) is desirable. This spacing assists good establishment and high early yields. There is some evidence that close spacing may accelerate the spread of swollen shoot disease and increase the percentage of pods attacked by phytophthora pod rot, but with the light overhead shade employed (mainly *Albizia zygia* and *Pithecolobium saman*) the most important factor in the longevity of a cacao farm is the maintenance of a closed canopy.

863. MURRAY, D. B.

A note on the growth analysis of cacao.

Rep. Cacao Res. imp. Coll. trop. Agric.
1945-1951, 1953, pp. 77-8, bibl. 1.

In comparisons between rooted single-leaf cuttings and seedlings the former made more rapid growth as measured by increases in dry weight and in leaf area. The rates recorded for growth and for net assimilation in cacao were very low compared with those of most annual plants in temperate climates.

864. HAVORD, G.

Manurial and cultural experiments on cacao (River Estate, Trinidad).

Rep. Cacao Res. imp. Coll. trop. Agric.
1945-1951, 1953, pp. 104-8, bibl. 9.

The lay-outs are described and discussed of the following experiments established at River Estate in 1949 or subsequently: (1) shade, spacing and fertilizer, (2) leguminous and non-leguminous shade, (3) spacing, mulching and trenching (trenches filled with pen manure and cut bush and then re-covered), (4) tillage and manuring, (5) planting-hole size, (6) micro-plot (initial responses of seedlings and cuttings to tillage and mulching), and (7) *Gliricidia* mulching. Further experiments are planned both on River Estate and on another station with markedly different soil.

865. WASOWICZ, T. E., AND HAVORD, G.

Ten years of a mulching experiment on cacao.

Rep. Cacao Res. imp. Coll. trop. Agric.
1945-1951, 1953, pp. 98-103.

The treatment of both seedling cacao and clonal

cuttings with mulch resulted in a definite improvement in the nutrient status of the soil, in the yield, and in the general vigour of the trees. The most spectacular increases were in available phosphate and exchangeable potash in the soil. The cost of mulching, however, was found to be uneconomical when related to the yield increases obtained, but, owing to the large residual effect of the mulch, costs might be reduced, with little loss in yield, by smaller and less frequent applications of mulch. The prime influence of mulch appears to be an improvement in the ecological conditions of the soil for cacao growth by the provision of a shallow layer of crumb soil immediately beneath the mulch which is particularly rich in nutrients and exhibits good physical properties. Soil conditions then resemble those found in virgin forest, which is the natural home of cacao. [Authors' summary.]

866. EVANS, H., AND MURRAY, D. B.

A shade and fertilizer experiment on young cacao.

Rep. Cacao Res. imp. Coll. trop. Agric.
1945-1951, 1953, pp. 67-76, bibl. 8.

1. A description is given of a shade experiment with cacao using five light intensities varying from 100% to 15% of full sunlight, secured by artificial shade, and incorporating different fertilizer treatments and clones. 2. Different light intensities produce markedly varying effects on the growth, habit and morphology of the plant. 3. Optimum light intensity during the first year appears to lie between 25% and 60%. Intensities above 85% retard growth. There is some evidence that the optimum light intensity increases with size of plant and consequent self-shading. 4. The effect of fertilizers is less marked at low than at high light intensities. The effect was complicated by uneven water relations in the field, leading to poor drainage and aeration. 5. Of the three clones used, ICS 60 has made the best growth at the 25% and 50% light intensities, but on the fully exposed plots ICS 1 has done better. [Authors' summary—see also *H.A.*, 22: 3039.]

867. EVANS, H., AND FENNAH, R. G.

Investigations on the mineral nutrition of cacao.

Rep. Cacao Res. imp. Coll. trop. Agric.
1945-1951, 1953, pp. 38-52, bibl. 16, illus.

The various injection techniques evolved by Roach at East Malling for the diagnosis of mineral deficiencies have been tested on cacao. The leaf injection technique has proved a useful and reliable method for diagnosing deficiencies of all essential elements except K. The rapid tissue test technique developed by Nicholas and others at Long Ashton has also shown considerable promise in cases both of deficiency and toxicity. Symptoms of malnutrition seen in the field are redescribed for N, Fe, Mg, Mn, Cu and Zn and symptoms of toxicity induced in cultures are described for excessive accumulation of salts, sodium chloride, B, Mn, Zn, Cu, Al and Fe. The results are described of preliminary experiments on curative methods for the correction of micro-element deficiencies. Solid injection proved ineffective with Fe and Mn. Soil application of iron sulphate produced no response in Fe-deficient cacao but Mn-deficient Robusta coffee responded to manganese sulphate. Striking responses were obtained in Fe-deficient cacao from spray applications of 0.5 and 1.0% iron sulphate

solutions; the higher concentration also killed mosses and most epiphytes. Liquid injection by gravity was unsuccessful, but an apparatus is described which has been used successfully to inject Fe, P and K solutions under pressures. Promising results have been obtained in small-scale trials with chelated iron both in plants in culture solution and in rooted cuttings in soil.

868. MASKELL, E. J., EVANS, H., AND MURRAY, D. B.

The symptoms of nutritional deficiencies in cacao produced in sand and water cultures.

EVANS, H., AND MURRAY, D. B.

A colour-illustrated guide to the diagnosis of mineral deficiencies in cacao.

Rep. Cacao Res. imp. Coll. trop. Agric.

1945-1951, 1953, pp. 53-64, bibl. 6, illus.,

and pp. 65-6, bibl. 3 plus 14 coloured plates.

The first paper gives descriptions of the main symptoms associated with deficiencies produced in sand and water cultures of N, P, K, S, Ca, Mg, Fe, Mn, Zn, Cu, B, Mo and Co. Details of experimental techniques will be published elsewhere. The second paper, in addition to 14 excellent large-scale coloured plates, provides a provisional key to symptoms of mineral malnutrition arising out of either deficiencies or toxicities of individual elements.

869. DE WITT, K. W.

The enzymes of cacao tissue.

Rep. Cacao Res. imp. Coll. trop. Agric.

1945-1951, 1953, p. 114.

Summarized extracts are given from a paper* prepared for the Fourth Conference of the Inter-American Technical Cacao Committee, Ecuador, May 1952. Preliminary studies are reported on the identification and activity of enzymes in cacao tissue, and a novel technique of embryo culture suitable for cacao is mentioned. In studies on enzyme activity in mineral-deficient leaf material, polyphenol oxidase was found to be lacking entirely in cases of Cu deficiency, catalase activity was below normal in cases of Fe and Zn deficiency, and peroxidase activity appeared to be reduced in cases of Mn, B and Mo deficiency. A method has been devised for the rough determination of catalase activity in the field to assist in the diagnosis of deficiencies, particularly of iron.

870. VALLECILLA, C. A.

La germinación del polen de cacao y el crecimiento del tubo polínico en relación con los fertilizantes substancias activas y substancias menores. (Pollen germination and pollen tube growth in cacao in relation to fertilizers, growth substances and trace elements.)

Acta Agron. Palmira, 1953, 3: 189-208, bibl. 17.

The self-fertile clones 5 and 6 were employed in experiments to determine the effect of growth substances, fertilizers and trace elements on pollen germinating capacity and pollen tube growth in cacao. The results were: (1) treatment with parachlorophenoxyacetic acid prolonged the life of artificially pollinated flowers (76% remaining on the 6th day after abscission zone treatment at 50 p.p.m., 48% after stigma treatments at

25 p.p.m. and 24% in the control) and increased pollen germination (75% compared with 50%) and pollen tube growth rate (0.126 mm. in 5 hours compared with 0.053 mm.); (2) vitamin B₁ had similar effects on pollen germination and pollen tube growth; (3) calcium glycerophosphate sprays increased pollen germination but urea did not; (4) treatments with PCA, vitamin B₁ and Ca glycerophosphate increased the number of beans per pod by 30%, 47% and 53% respectively; (5) trace element treatment had no effect. Spraying with a mixture of PCA, vitamin B₁ and Ca glycerophosphate is therefore recommended as a means of increasing fruit set and number of beans per pod.—Estac. agric. exp. Palmira.

871. CONSTAIN, J. C.

Mezclas entre fungicidas, fertilizantes y fitohormonas en aspersiones sobre arboles de cacao. (Spraying cacao with mixtures of fungicide, fertilizer and growth substance.)

Acta agron. Palmira, 1953, 3: 229-50, bibl. 16, illus.

Experiments are described in which the following materials were used separately and in various mixtures: 1% bordeaux mixture, 0.37% Cu oxychloride, 0.37% Zn ethylene dithiocarbamate, 0.5% urea (42% N), 0.5% Ca glycerophosphate and parachlorophenoxyacetic acid and its Na salt. It was found that growth substance alone increased fruit set, fungicide alone increased flower drop and greatly reduced fruit set, fungicide/growth substance gave better fruit set than fungicide alone, and fungicide/fertilizer/growth substance could safely be used and was very economical. The increase in fruit formation compared with the untreated control was 77% for a bordeaux/Ca glycerophosphate/growth substance mixture and a Cu oxychloride/Ca glycerophosphate/growth substance mixture and 117% for a Zn ethylene dithiocarbamate/Ca glycerophosphate/growth substance mixture.

872. HARDY, F., AND RODRIGUES, G.

Quantitative variations in nitrogenous components of the cacao bean: Effect of genetic type and soil type.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 89-91, bibl. 1.

1. The contents of total nitrogen and protein-nitrogen were found to be considerably greater (20% and 40% respectively) in purple beans produced either by forastero seedling cacao or by criollo seedling cacao than in white beans produced by criollo seedling cacao grown on the same soil. This may partly explain the longer period necessary for fermenting purple beans and their poorer flavour as compared with white beans. 2. The contents of total nitrogen and protein-nitrogen were also found to be greater in purple beans produced by ICS 45 (a criollo kind of cacao clone) and in purple beans produced by ICS 1 (a forastero kind of cacao clone) grown on four different soil-types than in white beans produced by ICS 45 grown on River Estate soil. 3. The contents of total nitrogen and protein-nitrogen were found to be greater in purple beans of ICS 1 grown on two reputedly "poor" soil-types than in ICS 1 beans grown on two reputedly "good" soil-types. This implies that cacao quality may partly be dependent on soil-type. [Authors' summary.—

* Not yet received.

The descriptions "purple" and "white" beans refer to freshly harvested, unfermented beans, not the under-fermented beans described as "purple" by the trade. In fact the authors describe the criollo material as including both white and purple beans mixed together in the same pod and they analysed the differently coloured beans separately.—Ed.]

873. HAWORTH, F.

The effect of age, season and environment on the nitrogenous components of cacao bean.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 92-7, bibl. 5.

Five separate investigations are reported with the following results: (1) From a comparison of various modifications of the Kjeldahl method of analysing nitrogenous components it is concluded that the H_2O_2 digestion technique is satisfactory for cacao materials. It can be used on a macro-scale using 30 vol. H_2O_2 without loss of accuracy. (2) The variability in bean composition, with respect to moisture, fat, theobromine, caffeine, total N, Cu, and Mn, is so large within a seedling cacao population that such material is of little use for determining the effects of environmental factors on bean composition. (3) No significant differences were found in amounts of N components present in ICS 1 beans that could be attributed to age of tree. (4) Analyses of ICS 1 beans harvested at different seasons showed some variations in moisture content but no appreciable variations in N constituents. (5) No significant variations were found in the N composition of ICS 1 beans due to soil and atmospheric environment.

874. KIRKPATRICK, T. W.

Insect pests of cacao and insect vectors of cacao virus disease.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 122-5, bibl. 5.

Short accounts are given of the cacao virus disease in Trinidad, in which it would now seem that 2 distinct viruses rather than 2 strains of one virus are involved, the spread of virus in the island, transmission experiments with the mealy bug vector *Pseudococcus citri*, the bionomics of *P. citri*, its ant attendants, predators and parasites.

875. COPE, F. W.

Statistical studies in the effects of virus infection upon yield in clonal cacao.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 126-9, bibl. 4.

A statistical study was made of the effect of virus upon the yields of cacao clones in 2 trials at River Estate, Trinidad. Virus infection was of the type strain A, which has not yet, with certainty, been shown to kill its host. Records in the 2 trials covered 4 and 3 crop seasons respectively. Significant negative regression coefficients were found in both cases. The smallest average loss of yield was 6.6% per annum. The relationship appeared to be linear in the early years, but a tendency to level off found in the fourth and fifth years after infection makes the final relationship uncertain. The relative reduction in yield due to virus was significantly greater in manured trees than in unmanured trees.

876. DALE, W. T.

Further notes on the spread of virus in a field of clonal cacao in Trinidad.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 130-1, bibl. 2.

The spread of virus disease (strain A) in a field of ICS clones is shown on maps covering 8 successive years. Most new infections occurred among trees in contact with those already diseased. Removal of diseased trees did not give adequate control owing to latent infection of contacts. There was no evidence of differences in susceptibility between clones.

877. MANOTAS A., L. E.

El contenido en azúcares y ácidos orgánicos de la mazorca de cacao y su probable relación con ataques de enfermedades. (The content in sugars and organic acids of the cacao bean and its probable relationship with disease incidence.)

Acta Agron. Palmira, 1953, 3: 177-88, bibl. 6, illus.

Experiments on Forastero (subtype Angoleta) cacao pods are described. These suggest a relationship between fungal attacks by *Monilia* and *Phytophthora* which chiefly occur in pods of medium to old age and the high contents of glucose, organic acids and pectins and low content of tannins. It is suspected that the tannins, of which the content is high in the earlier life of the pod, may have an inhibitory effect on fungal attack.

878. HOLLIDAY, P., AND BAKER, R. E. D.

The susceptibility of the ICS clones to witches' broom disease at River Estate, Trinidad.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 119-21.

All ICS clones are attacked by witches' broom disease, but analysis of the percentage of pods infected shows wide and fairly consistent variation in susceptibility. Among high yielding clones ICS 1, 6, 44, 95 and 98 are relatively resistant. In general there appears to be a correlation between the number of vegetative and cushion brooms produced and the percentage of diseased pods, but there are cases in which no correlation appears to exist and these require further investigation.

879. WILLIAMS, G.

Field observations on the cacao mirids, *Sahlbergella singularis* Hagl. and *Distantiella theobroma* (Dist.), in the Gold Coast. Part I. Mirid damage.

Bull. ent. Res., 1953, 44: 101-19, bibl. 15.

The two species of mirid, *Sahlbergella singularis* and *Distantiella theobroma*, are important pests of cacao in the Gold Coast. In the field, mirid damage may be classified into three categories. "Blast" is the result of light diffuse attack. "Stagheaded cacao" is more severe, the trees showing numerous small crown branches but forming a poor canopy. "Mirid pocket" describes severe damage, normally limited to a small area. Consideration of the factors associated with mirid damage shows that it is correlated with breaks in the cacao canopy. Evidence is brought forward to suggest that such breaks normally precede, rather than result from, mirid attack. The most important single factor

influencing the form of the cacao canopy, and thus the course of mirid attack, is the amount of overhead shade, particularly that provided by trees little taller than the cacao itself. Shade which is too dense causes etiolation of the cacao and thus renders it susceptible to attack, the resulting damage generally taking the form of a pocket. When shade is too sparse mirid damage generally assumes the stagheaded form. It is suggested, from field experiments, that the invasion by mirids of areas suitable for colonization is not by random movements, but is determined by the change in some physical factor resulting from the broken canopy. Changes in light intensity are the most obvious results of such breaks, but further experiments are needed to determine which is the operating factor. Degraded cacao is prevented from recovery, not by mirid attack alone, but by the interaction of it with the presence of *Calonectria rigidiuscula*, and by increased exposure. The sampling methods employed are described, and the bearing of the results upon control measures is discussed. [From author's summary.]—West Afr. Cacao Res. Inst., Tafo.

880. LEVER, R. J. A. W.

Cockchafer pests of cacao and other crops.
Malay. agric. J., 1953, 36: 89-113, bibl. 18, illus.

Keys, supported by illustrations, are given for the identification of 14 species of beetle, the adults of which damage the leaves of cacao and certain other plants. The most important of these are *Apogonia cribricollis*, *A. expeditionis*, *Chaetadoretus cribratus* and *Lepadoretus compressus*. Life histories and larvae population studies in the soil are described. Based on the results of control experiments described, recommended measures are: (1) the erection as physical barriers of guards consisting of palm fronds around and over young trees up to about 1 year old; (2) destroying larvae and adults in the soil with BHC (1½ lb. wettable powder in 12 gal. water) applied at up to 1 qt per large tree; (3) the application to foliage every 4 weeks or less as a repellent spray of 0.4%, and in very wet weather 0.6%, lead arsenate.

881. DE WITT, K. W.

Studies in the small-scale fermentation of cacao.

Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, pp. 110-13, bibl. 6.

The following are among the points made in these summarized results of investigations on methods of fermenting small samples of cacao. The aseptic method of curing patented by the General Foods Corporation (British Patent No. 31758, 1948) when tested gave a product closely resembling fermented cacao in appearance but quite distinct in flavour when roasted. MacLean's method [see *H.A.*, 22: 1902] was shown to need certain modifications. Stages in the development of a microfermentary are described. Improved insulation against loss of heat was obtained using a beaker fitted into a double thermos jar, but temperatures reached were still 5°-8° C. lower than those encountered in the commercial sweat-box. Further heat control and greater flexibility in the fermentation procedure was obtained by using a low-powered heating coil, not to heat the beans themselves, but to compensate for heat lost, mainly by conduction. Provision was also made for

forcing air through the fermenting mass under slight pressure. This was done because observations tended to support MacLean's contention that a slow aeration is necessary throughout the fermentation process. Forsyth and Rombouts [see *H.A.*, 22: 1899] had found that anaerobic organisms predominated during the first 48 hrs of normal fermentation, and it is suggested that this apparent anomaly may be explained by the need for some air to control the dominant type of micro-organism in the pulp while at the same time excluding air from the interior of the bean. Reasons are also given for regarding sun-drying, which avoids excessive temperatures, as an essential part of the fermentation process. Finally, a method used for preparing samples for local tasting tests is described.

Cloves.

(See also 842, 861.)

882. GOLDSTEIN, C.

Cloves and clove oil.

J. sci. industr. Res., India, 1953, 12B: 281.

Clove buds from South India yielded 16-17% oil containing 94-97% eugenol and clove stems 7% oil containing 95% eugenol.

883. ZANZIBAR.

Annual Report of the Zanzibar Department of Agriculture, 1953, 1953, pp. 29, sh. 2.

Cloves. A method of control of die-back disease (*Cryptosporrella eugeniae*) has been worked out in this, the last, year of the Clove Research Scheme. Circumstantial evidence that a *Valsa* sp. is the cause of sudden death is considered sufficiently strong to warrant the discontinuation of research on the identity problem; 2 long-term experiments in field control are to be inaugurated. **Coconuts.** Studies have been conducted on the taxonomy, life history, insecticidal and biological control, and host range of *Theraptus* sp., the insect causing gumming disease.

884. NUTMAN, F. J., AND ROBERTS, F. M.

Two new species of fungi on clove trees in the Zanzibar protectorate.

Trans. Brit. mycol. Soc., 1953, 36: 229-34, bibl. 1, illus.

Descriptions with brief field observations are given of *Valsa eugeniae* sp. nov., which occurs in constant association with clove trees that have died of sudden-death disease, and also causes a die-back, and of *Cryptosporrella eugeniae*, which is a severe wound parasite of clove trees of all ages and often causes the sudden death of young trees.

885. NUTMAN, F. J., AND ROBERTS, F. M.

Investigations into diseases of the clove tree in Zanzibar.

E. Afr. agric. J., 1953, 18: 146-54, bibl. 21.

The chequered history of investigations into the major diseases of the clove tree during the past half century is critically reviewed. Periods of apathy and of uncompleted and disconnected research work alternated, with short visits by experts intervening. Few involved were without blame. An orderly approach to the problem was only initiated in 1946 with the setting up of the Clove Research Scheme, of which the authors were members. Investigations under the scheme have

shown that both major diseases are caused by fungi, "sudden death" of mature trees and the "slow decline" of young trees by a new species of *Valsa* and "dieback" by *Cryptosporella eugeniae*, also a new species. The latter can be prevented and also readily controlled. In the case of sudden death, however, long-term technological experiments will be needed to provide information on which to base control and rehabilitation measures; these are properly the responsibility of the Department of Agriculture. The industry is in serious jeopardy, with more than half the mature trees in Zanzibar Island dead, and over 2,000 separate outbreaks in Pemba Island in 1950.

886. WILLIAMS, R. O., AND BRIANT, A. K.
The clove industry in Zanzibar and Pemba.
World Crops, 1953, 5: 414-16, illus.

The publicity attending recent investigations on the diseases of cloves [see preceding abstract] has created an impression among many people that the clove industry of these islands is rapidly dying out. The present note has been written to correct this impression. The work carried out over a long period to ensure the maintenance and rehabilitation of the industry is outlined. Although over the past 50 years the annual average production of Zanzibar has declined by 25%, that of Pemba has risen by 13% and the total production of the Protectorate has increased by 4%. Average production during the last decade, 1942/43 to 1951/52, was only 13.4% below the record output recorded in the preceding decade.

Coconuts.

(See also 833, 839, 840, 883, 927, 1016p, 1017e, g, h, t.)

887. CHILD, R.
The coconut.
New Biol., 1953, No. 15, pp. 25-42, bibl. 7, illus.

All about the coconut, its pests, diseases, products and controversial history in non-technical language by a leading expert.

888. GROGAN, F. O., KNIGHT, A. F., AND BENNETT, A. J.
An economic and cost survey of the copra industry in the territory of Papua and New Guinea.
Bull. Bur. agric. Econ., Dep. Commerce Agric. Aust. 9, 1953, pp. 70, map.

The results of this detailed survey are presented in 2 parts. The first gives a brief description of the industry in the Territory and the factors that have influenced its development. The second and larger part is concerned with costs of production and includes details of methods of analysis, definitions of cost items, itemized cost data and range of costs, and the factors affecting costs, notably yields per acre, size of plantation, cost and efficiency of labour, cost of materials, subsidiary cropping and location of plantations.

889. I.R.H.O.
Cocotier. (Coconut palms.)
A.R. Inst. Rech. Huiles Oléag. 1952, 1953, pp. 62-5.

Research projects included organic manuring and mineral fertilization of bearing palms, mineral fertiliza-

tion of deficient adult palms, a method-of-application fertilizer trial, green manuring, interplanting with food crops, spacing, and a study of the mineral nutrition status of coconuts in Togo suffering from a disorder akin to "unknown disease".

890. KAILASARAO, T.
Coconut nursery practices in Andhra Pradesh.
Bull. Indian centr. Coconut Cttee, 1953, 7: 43-7, illus.

Round and spheroid summer nuts of medium size from very old trees (65-70 or more years old) are preferred. In a certain irrigated area where waterlogging is general in the rainy season the seed is soaked for 1½-2 months before sowing in irrigated beds; the seedlings are transferred to another nursery after a year and are finally planted out at 2½-3 years old. In another (coastal) area seedlings are raised in pure sand and planted out when 1 year old.

891. DAVIS, T. A., ANANDAN, A. P., AND MENON, K. P. V.
A case of polyembryony in coconut.
Indian Coconut J., 1953, 6: 67-71, bibl. 8, illus.

The polyembryonic production of 2 seedlings through the soft eye of one nut at Kayangulam is described, and the literature on polyembryony, polycarpy and fasciation in coconut is briefly reviewed.

892. VERGHESE, E. J., KRISHNA MARAR, M. M., AND THOMAS, P. K.
Preliminary studies on the variation in moisture in coconut soils.
Indian Coconut J., 1953, 6: 49-59.

Measurements made at the Central Coconut Research Station, Kasaragod, during the dry summer months of 1951/52 showed that: (1) Regular inter-cultivation combined with green manuring helped to conserve moisture, especially in the sub-soil, better than non-cultivation with attendant growth of weeds and grasses. (2) Plots shaded by regularly and closely planted trees may retain more moisture than partially shaded plots, but the results obtained were not conclusive. (3) In littoral sands the presence or absence of trees made no appreciable difference to the moisture content, which declined to very low levels down to 3 ft. in depth during summer. (4) In seedling beds watered weekly, mulching with dry coconut leaves tended to conserve moisture.

893. SESHADRI, C. R., AND SAYEED, P. M.
Profitable subsidiary crops.
Bull. Indian centr. Coconut Cttee, 1953, 7: 19-21.

Trials conducted at the Coconut Research Station at Nileshwar in South Kanara led to the conclusion that intercropping with such crops as dry paddy, tapioca, sweet potato and groundnut (the last in rotation with the others) is to be encouraged on the West Coast of India not only for financial reasons but also as a means of maintaining gardens in a good state of fertility and cultivation.

894. GANGOLLY, S. R.
A résumé of investigations on the shedding of buttons in the coconut (*Cocos nucifera* L.).
Indian Coconut J., 1953, 6: 60-6, bibl. 25.

The literature on the shedding of buttons (female flowers) of the coconut is reviewed and investigations in progress at Kasaragod on the problem are mentioned. Preliminary trials with 2,4-D sprays have shown promise, but further study is needed.

895. WICKREMASURIYA, C. A.

A ladder for coconuts.

Ceylon Coconut Quart., 1953, 4: 22-3, illus.

A short description is given of a 4-sectioned ladder extendable to 45 ft, which is built on the principle of a crane with a turn-table and counter-weight and need not rest against the trees. The unit is mounted on a 2-wheeled chassis drawn by a tractor.

896. MARTYN, E. B.

Red ring disease of coconuts in Trinidad and Tobago.

Trop. Agriculture, Trin., 1953, 30: 43-53, bibl. 16.

The symptoms of red ring disease of coconuts are associated with the production of a strongly reducing substance in the periphery of the cortex of young palms invaded by the nematode, *Aphelenchoides cocophilus*. Inoculation experiments showed penetration via the leaf axils to be the normal means of entry of the parasite. The coconut weevil, *Rhynchophorus palmarum*, also transmitted the disease by transferring debris on its legs and body from diseased to healthy palms; it can be inferred that the weevil *Rhina barbirostris* can do likewise. Roots were inoculated artificially, but this mode of infection is of negligible importance under natural conditions. Trials showed that the disease could be controlled by removing all infected palms and burning all diseased tissues. In limited tests systemic insecticides failed to kill the nematodes.

897. FRANCO, E.

Nota prévia sobre as possibilidades de tratamento do "anel vermelho do coqueiro". (A preliminary note on the possibility of controlling the red ring nematode in coconuts.) *Rev. Agric. Piracicaba*, 1953, 28: 163-74, bibl. 43.

The nematode *Aphelenchoides cocophilus* is one of the most serious pests of coconut in Brazil. Literature on the control of nematodes by systemic insecticides is reviewed, and an account is given of trials carried out in Brazil in 1949 and 1952 with Rhodiatox (diethyl-paranitrophenyl thiophosphate) in several coconut plantations. Trunk injection gave promising results.

898. FRANSSEN, C. J. H., AND MO, T. T.

Biologische bestrijding van de klapperplagen op Zuid-Celebes. (Biological control of coconut pests in southwest Celebes.) [English and Indonesian summaries 1½ pp. and 5½ pp. respectively.]

Landbouw, 1952, 24: 319-60, bibl. 42, illus.

A serious outbreak of "coconut disease" in the Salajar Islands in 1912 was found to be caused by a group of insects including the whitefly *Aleurodicus destructor*, the beetles *Brontispa longissima* and *Oryctes rhinoceros*, and the palm weevil *Rhynchophorus ferrugineus*. An account is given of the spread of this trouble and of the attempts made to control the pests biologically. Successful control of *Brontispa longissima* was finally

achieved by introduction of the pupa parasite *Tetrastichodes brontispae*, with the result that the trees were no longer weakened and infestation by the other pests ceased to be a problem.

899. CHETTIAR, T. P. R.

The coconut caterpillar (*Nephantis serinopa* Meyr.).

Bull. Indian centr. Coconut Cttee, 1953, 6: 145-8, illus.

The moth's life history is outlined. Seven parasites help to keep it under control, and one of these, *Microbracon brevicornis*, is now raised in large numbers at the Central Coconut Research Station, Kayangulam, for distribution to growers. Recent trials have also shown that the caterpillar can be controlled by 3 applications a year of 0.2% wettable DDT.

900. JAYADAS, C. S., AND VARIER, N. S.

Destructive distillation of coconut shells.

Indian Coconut J., 1953, 6: 72-3, bibl. 5.

In the course of an investigation on the insecticidal properties of the phenols from coconut shells, destructive distillation yielded 17% to 20% gases, 35% to 37% pyroligneous acid (containing 6% to 9% settled tar which contains 70% phenols) and 35% to 37% residual charcoal.

Coffee.

(See also 594, 834, 835, 1016y, 1017a, p, 1045.)

901. CRANE, J. C., AND GREENE, L.

Abstracts of some of the literature pertaining to coffee.

GREENE, L.

Idem II.

Publs Off. Foreign agric. Rel., U.S. Dep. Agric., 1948 [reprinted 1953], pp. 133, and 1953, pp. 152, both cyclostyled.

Part I of these extensive annotated bibliographies was started in 1945 by the senior author in preparation for research work on coffee in El Salvador and completed by the junior author. In Part II the latter brings the material up-to-date and includes certain earlier references not listed in the first part. In both cases the arrangement is similar, sections being devoted to soils and nutrition, varieties and breeding, shade, propagation, pruning, flowers and fruiting, and general information. Part II also contains sections on field plot technique, processing and spraying. Cross referencing is done by repeating titles and the number of the abstract. There are no subject or author indexes. Papers written in English from about 1930 onwards would appear to be particularly well covered, Dutch and French rather less so, and rather surprisingly, Spanish and Portuguese very much less so. On the credit side, the material is presented, in many cases, in so much detail as to make reference to the original article unnecessary. These abstracts will be a valuable acquisition to anyone concerned with research into the growing of coffee and it is to be hoped that the response to them will be such as to encourage the issue from time to time of further editions.

902. FERREIRA FILHO, J. C.

Cultura do café. (Coffee growing.)

Bol. Super. Serv. Café, S. Paulo, 1953, 28 (313): 27-44, and 28 (314): 18-34.

Notes are given on every aspect of coffee growing, harvesting and processing in Brazil. A summary of some points follows. The arabica varieties grown are Nacional (or Common), Bourbon (rarely a pure type), Yellow (Botucatu), Maragogipe, San José do Rio Pardo, Yellow Bourbon and Caturra; Conilon or Quillon is a robusta variety. The mean temperature in the main coffee zone is 18-24° C. and there is a well-distributed rainfall of 1,200-1,800 mm. p.a. and a 3-months dry season, indispensable for harvesting, from June to August. Most plantations lie between 500 and 800 m. above sea level. Plantation spacing ranges from 3.0-3.5 m. square in average soils to 4.2-4.5 m. square in the most fertile. Plantations are established either by direct sowing or by planting. Shade is provided. In early life weeding is the most important cultural operation and occurs 4-6 times a year; alternatively intercropping, chiefly with maize and beans, is carried out for the first 4-5 years. In later life cover cropping is now replacing clean weeding. Topping is not practised and pruning is confined to the removal of dead and diseased branches, water sprouts and basal growth. Harvesting takes place between April and September and is preceded by a cleaning of the ground beneath the bushes. The collection of early, naturally fallen cherries (which give an inferior product) precedes the main harvest in which ripe and unripe fruit and much of the foliage are roughly stripped from the trees.

903. LARA, B. E.

Variedades de café en Costa Rica. (Coffee varieties in Costa Rica.)

Mimeo Fedecame, January 1953, from abstr. in *Bol. inf. Colombia*, 1953, 4 (42), No. 770.

The local arabica, the variety formerly most commonly planted in Costa Rica, is low-yielding and susceptible to fungal diseases. In some areas it has been replaced by a variety (probably a local arabica × bourbon hybrid) the seed of which was introduced from El Salvador, a variety which requires good soil and careful culture but is disease-resistant. San Ramon, another variety grown in Costa Rica, is hardy, high-yielding and disease-resistant and is used in breeding.

904. CARVALHO, A., AND OTHERS.

Melhoramento do cafeeiro. IV. Café Mundo Novo. (Coffee breeding. IV. Mundo Novo coffee.) [English summary $\frac{3}{4}$ p.]

Bragantia, 1952, 12: 97-129, bibl. 21, illus.

An account is given of Mundo Novo coffee (of Sumatra × Bourbon origin) selections of which are being multiplied for release.

905. IYENGAR, B. N.

Coffee manuring.

NARAYANAN, B. T.

Notes on Dr. B. N. Iyengar's paper.

Indian Coffee, 1953, 17: 155-8 and 158.

The first author, a former Director of Agriculture in Mysore, cites past experience and submits tables showing estate yields in support of his contention that, under normal conditions, a balanced N, P₂O₅, K₂O ratio for use on coffee should be 2: 3: 4. For an average crop of 600 lb. clean coffee per acre the amounts applied should be 30 lb. N, 45 lb. P₂O₅ and 60 lb. K₂O. The second author, who is Director of Research at

Balehonnur, gives reasons in support of recommendations for increasing N applications to 40 lb. per acre and reducing applications of P and K.

906. URHAN, M.

El análisis de hojas y la respuesta de los cafetos a algunos fertilizantes. (Foliar analysis and the response of coffee to some fertilizers.)

Bol. inf. Colombia, 1953, 4 (42): 36-8.

In field experiments conducted in 1950-52, typica and bourbon plots received 3 treatments: no fertilizer, bone meal, bone meal plus K₂SO₄. P plus K gave a yield increase but P alone increased leaf P without increasing yield.

907. PARRA H., J.

Las chapolas de café en el estudio de los suelos. (The use of coffee seedlings in the study of soils.)

Bol. inf. Colombia, 1953, 4 (42): 15-26, bibl. 8, illus.

Pot experiments in which the effect of N, P, K, Ca, Mg and a mixture of trace elements was tested showed that coffee seedlings are good indicators of soil nutrient status.

908. COSTA, A. S., AND MENDES, J. E. T.

Clorose das folhas do cafeeiro excelsa. (Leaf chlorosis of excelsa coffee.) [English summary 11 lines.]

Bragantia, 1951, 11: 223-6, bibl. 6, illus.

A leaf chlorosis due to Fe deficiency has been observed for some years in nursery plants of *Coffea dewevrei* var. *excelsa* at the Estação Central do Instituto Agrônômico, Campinas. It makes the use of excelsa as a rootstock difficult but is of little economic importance since it does not affect other species growing on their own roots. In grafting experiments the chlorosis only manifested itself in combinations in which excelsa was the rootstock and in those in which it was used as a scion on arabica. Chlorotic arabica and excelsa scions recovered normal colour when transferred to an arabica rootstock.

909. CARVALHO, A., AND FILHO, H. A.

Novas observações sobre o dimorfismo dos ramos em *Coffea arabica* L. (New observations on branch dimorphism in *Coffea arabica*.) [English summary 8 lines.]

Bragantia, 1952, 12: 81-4, bibl. 6, illus.

Notes are given on two cases in which an orthotropic branch developed from a plagiotropic one, and one case in which an orthotropic branch appears to have become plagiotropic.

910. MENDES, J. E. T.

Ensaio de desbaste de ramos inferiores do cafeeiro. II. (Trial of pruning the lower branches of coffee. II.) [English summary $\frac{1}{4}$ p.]

Bragantia, 1951, 11: 277-84, bibl. 2.

This trial [see H.A., 18: 2964 for an account of earlier results] was continued, the test trees of *Coffea arabica* var. *typica* being either entirely unpruned or maintained branchless for 50 cm. above ground. Pruning showed no advantage. Data from 1935, when harvesting began, to 1950 show that in unpruned trees yields are slightly

greater, maturation is slightly later and the size of the beans is ordinarily slightly greater.

911. CASTAÑO A., J. J.
La "llaga macana" o "cancer del tronco y de los tallos del cafeto". (Macana rot or coffee trunk and branch canker.)
Agric. trop. Bogotá, 1953, **9** (5): 39-47, bibl. 8, illus.

This fatal disease, caused by the saprophyte and wound parasite, *Ceratostomella fimbriata*, is widely distributed in the main coffee areas of Colombia. The most commonly attacked varieties of arabica are typica, bourbon and maragogipe. The symptoms consist of thin yellowish foliage, desiccated patches on the branches, premature yellowing and drying of the beans, and hard dark patches on the inner bark, the phloem and the surface of the wood. Control measures are wound prevention, free air circulation and avoidance of excessively high humidity. Provided a lesion has not ringed the stem, complete cure can be achieved by cutting out the infected tissue, disinfecting with formalin solution and painting with bordeaux. [See also *H.A.*, 23: 4611.]

912. STEVENSON, J. A., AND BEAM, R.
An annotated bibliography of coffee rust (*Hemileia* spp.).
Spec. Publ. Div. Mycol. Dis. Surv., Bur. Plant Ind., U.S. Dep. Agric. 3, 1953, pp. 80.

This comprehensive bibliography contains about 900 references arranged in alphabetic order by authors. The annotations are for the most part indicative rather than informative, but references are given in many cases to abstracts in the *Review of Applied Mycology* and other abstract journals.

913. MALLAMAIRE, A.
La rouille vraie du caféier causée par *Hemileia vastatrix* B. et Br. au Dahomey. (Coffee rust in Dahomey due to *Hemileia vastatrix*.)
Bull. Centre Rech. agron., Bingerville, 1952, **6**: 51-61, from abstr. in *Trop. Abstr.*, 1953, **8**: 613.

Hemileia vastatrix was first reported at Niaouli experiment station in 1952. A table shows the degree to which the coffee varieties grown there are affected.

914. PÉREZ S., V. M.
Control del ojo de gallo por medio de fungicidas. (Fungicidal control of coffee leaf spot [*Omphalia flvida*].)
Rev. Agric. Costa Rica, 1953, **25**: 140-51, 171-88, bibl. 4, illus.

Monthly spraying with perenox gave complete control of coffee leaf spot. Other copper compounds also gave control but were phytotoxic. Severe pruning to lighten shade is unnecessary after leaf spot has been controlled.

915. SAUER, H. F. G.
Efeito dos inseticidas orgânicos sobre as larvas do bicho mineiro do café no interior das galerias. (The effect of organic insecticides on coffee leaf miner larvae in their galleries.)
Biologico, 1953, **19**: 57-9.

In experiments on the control of *Leucoptera coffeella*

larvae 9 products were tested at the rate of 1.5 l. per tree. Parathion gave the best results (100% mortality on the 5th day) but had a shorter residual effect than dieldrin (61%). The 2 products in mixture gave 91% mortality after 3 days and maintained control for more than 40 days (89%).

916. BOND, J. A. B.
Trunk absorption of a systemic chemical by coffee.

Bull. ent. Res., 1953, **44**: 97-9, bibl. 3, illus.

The systemic insecticide hanane (mainly bisdimethyl-amino fluorophosphine oxide) is readily absorbed by the trunk of a coffee tree and translocated to the foliage when the bark is lightly scraped and the chemical applied in solution on a pad of absorbent material covered with a waterproof skin to prevent evaporation. Smaller dosages of hanane are required to give equivalent control of *Planococcus kenyae* (Le Pelley), or to cause a similar degree of phytotoxic damage, by this method than by soil treatment. Abrasion or removal of the bark before application enables a greater absorption of the chemical but leads to serious phytotoxic damage by a comparatively low dosage. [Author's summary.]

917. TAPLEY, R. G.
A note on mites as new pests of *Coffea arabica* in Tanganyika.
E. Afr. agric. J., 1953, **18**: 191-2, bibl. 5, reprinted in *Mon. Bull. Coffee Bd Kenya*, 1953, **18**: 498, bibl. 5.

Three species of mite, of which the most important is *Hemitarsonemus latus*, have been found infesting coffee trees at the Coffee Research Station, Lyamungu. Until more is known of the biological complex involved, it is suggested that pyrethrum be used in place of DDT for the control of *Antestia* bug wherever mites are also present.

918. LEONI, I.
O problema do caramujo na lavoura cafeeira. (The snail problem in coffee growing.)
Bol. Super. Serv. Café, S. Paulo, 1953, **28** (315): 12-15.

More than 90% mortality was obtained in a heavily infested coffee plantation with a 5% metaldehyde spray applied at the rate of 1 l. dilute solution (about 10 g. metaldehyde) per tree. The concentrated solution consisted of 6 kg. metaldehyde, 2 l. linseed oil and 6-8 l. whole milk made up to 30 l. with water. The treatment was applied at the beginning of the rains (October).

919. CARBONEL, J. R., AND VILLANOVA M., T.
Beneficio rápido y eficiente del café mediante el uso de la soda cáustica. (Rapid and efficient fermentation of coffee by the use of caustic soda.)
Café Salvador, 1952, **22**: 409-553, from abstr. in *Bol. inf. Colombia*, 1953, **4** (43), No. 799.

Notes are given on a modification of the wet fermentation process developed at the Centro Nacional de Agronomía in El Salvador. The mucilage is removed from newly pulped beans before they enter the fermentation tanks by treatment with 1% caustic soda at 250 c.c./kg. of pulped beans; they can be washed after

10 minutes. The treated beans have good appearance and liquoring qualities.

920. VENKATACHALAM, V., AND SUNDARAM, S.

Caffeine content of coffee.

Curr. Sci., 1953, 22: 275-6.

Abnormally high caffeine contents of 2.2% to 2.6% found in certain recent samples of coffee analysed in India are thought to be due to the introduction to cultivation of new varieties of African origin.

921. WEISS, L. C.

Report on chlorogenic acid in coffee.

J. Ass. off. agric. Chem. Wash., 1953, 36: 663-70, bibl. 2.

Recovery of chlorogenic acid from ground green coffee by various techniques ranged from 7.62% to 8.30% on a dry basis, but methods of sample preparation need further study.

Guavas.

922. SANTINI, R., Jr.

Identification and determination of polybasic organic acids present in West Indian cherries (*Malpighia puniceifolia* L.) and in three varieties of guava (*Psidium guajava*).

J. Agric. Univ. Puerto Rico, 1953, 37: 195-8, bibl. 4.

Citric acid was found to be the polybasic organic acid present in large amounts in guavas. Therefore its determination cannot be used as a test for adulteration of guava jelly. Tartaric acid, as well as levo-malic acid, was also present in small amounts in the three varieties of guavas analysed. The only polybasic organic acid found in the West Indian cherry was levo-malic acid. Monobasic acid, ascorbic acid, and dehydroascorbic acid (lactone form) were also present in considerable quantities. [Author's summary.]

Mangoes.

(See also 837, 840.)

923. DE LA ROCHA G., G.

El injerto del mango. Resultados de los ensayos de propagación obtenidos en la Estación Experimental Agrícola de La Molina. (Mango grafting. Results of propagation trials at La Molina Agricultural Experiment Station.)

Bol. Estac. exp. agric. La Molina 49, 1953, pp. 20, bibl. 5, illus.

An account is given of successful bench grafting of mango seedlings by the splice method. Scions of 4 varieties containing at least 3 buds were taken from the ends of actively growing branches of plants of 8 months, and 1 and 2 years old. Eleven-months-old Haden stocks were used and were topped to 10 cm. with a sloping cut 3-4 cm. long. The grafts were tied with rubber bands and sealed with warm paraffin wax. The scions from the 8-month-old plants gave the best results, an average take of 90%.

924. JOSHI, N. C.

Some recent observations on lassi disease of mangoes and its control.

Sci. and Cult., 1953, 19: 41-2, bibl. 1.

Nymphs and adults of *Idiocerus atkinsoni* suck the juice of mango shoots, flower buds and inflorescences, thereby causing them to drop, and secrete a sticky fluid, "lassi", on the upper surface of young leaves. No experimental data are presented, but it is stated that spraying with 25% DDT will control the insect. The biology of *I. atkinsoni* is discussed.—Govt Coll., Ajmer.

925. MATHUR, P. B., SINGH, K. K., AND KAPUR, N. S.

Cold storage of mangoes.

Indian J. agric. Sci., 1953, 23: 65-77, bibl. 6.

The authors, after considering storage trials reported by other workers, give an account of their own work at Mysore in 1951. Mangoes of the varieties Seedling, Raspuri and Badami were picked fully grown but hard and not showing any yellow colouring. The percentage edible portion is greater in Raspuri and Badami than in Seedling. Badami has the greatest ascorbic acid content. 42-45° F. seems to be the storage temperature which ensures minimum physiological losses in weight in all three. Percentage of total soluble solids increased during storage in all varieties and at all temperatures tried. Seedling mangoes were still fresh after 42 days' storage at 42-45° F. 42 days is the maximum storage period in which Raspuri mangoes will keep green at 42-45° F. Badami could not be stored beyond 28 days at 42-45° F. without deterioration. Notes are given on appropriate temperatures for ripening Badami and Raspuri mangoes following storage for different periods, and on low temperature and anthracnose injury. [See also *H.A.*, 23: 4621.]

Oil palms.

(See also 834, 835, 1016t, v, 1060.)

926. TOOVEY, F. W.

The Institute. [The West African Institute for Oil Palm Research.]

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 7-23, map.

The West African Institute for Oil Palm Research only came into effective being on 1 April, 1952, but it had a fairly solid basis of experience on which to build, derived from its predecessor, the former Oil Palm Research Station of Nigeria. In this article the Director of the Institute describes the satisfactory arrangements made for finance, the organization and staffing of the Institute and its subsidiary stations, and the main lines of work that are being pursued.

927. INSTITUT DE RECHERCHES POUR LES HUILES ET OLÉAGINEUX.

Rapport annuel 1952. (Annual Report of the Institute for Research on oils and oil plants for 1952), Paris, 1953, pp. 144.

Oil palm. Research projects include leaf analysis, mineral fertilization, cultural experiments (thinning natural palm groves, spacing, intercropping), special studies (mechanization, mineral nutrition), and selection. The principal factors controlling total yield are the number of trees per ha. and their individual production. In an old natural palm grove under management a reduction in the number of palms from 213 to 160 per ha. raised total yield from 2,810 kg. to 4,930 kg. per ha. The first results of experiments on

young palms coming into bearing show that in low rainfall areas the optimum density may be as low as 100 per ha. Ground cover is indispensable for the maintenance of soil structure but competes with the palms for water, and its dry season behaviour should be studied with a view to reducing this competition. The good condition of plots carrying food crops at Pobé is probably due to the shallow cultivation of these crops conserving soil water; the intercropped palms had 5.82 inflorescences per tree compared with 3.96 in those with leguminous cover crops. African soils in general are poor in mineral contents and leaf analysis provides a valuable means for early detection of mineral deficiencies. *Coconut palm*. Research projects include mineral fertilization and diseases. [See separate abstracts on oil palm leaf analysis and mineral nutrition, and on coconut research.]

928. DEVUYST, A.

Selection of the oil palm (*Elaeis guineensis*) in Africa.

Nature, 1953, 172: 685-6.

Selection work on oil palms has, up to now, not eliminated the wide variation in the yields of individual palms and consequently production in weight of bunches has, as yet, been little improved. In the search for a criterion that would facilitate selection at an early stage, the author found a positive correlation between the total leaf area produced during a particular period before fruiting begins and the weight of bunches produced in later years. Precocity also proved to be related to the total leaf area produced by young plants. Further studies revealed that there is a very marked correlation between the height of 1-year-old plants and the total leaf area produced. Under uniform conditions a rational selection can thus be carried out in the nursery. Observations on a physiological disequilibrium, occurring mainly at the time of active growth of the first female inflorescences, have thrown new light on the pathological condition known as "little leaf".

929. ANON.

The production and distribution of improved seed by the Institute.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 95-7.

Pending a decision on seed production policy 3 types of seed are being distributed in roughly equal amounts. Over 500 mother trees, mostly dura, have been selected on a basis of bunch yields recorded over many years and on fruit composition. Alternate bunches on these trees are pollinated by pollen from dura, tenera or pisifera trees respectively. The selection of dura and tenera pollen trees is even more rigid than that of mother trees, but the selection of pisifera pollen trees is difficult.

930. ANON.

Notes on establishing an oil palm nursery.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 88-92.

The nursery technique adopted at the West African Institute's main station, which suffers from a relatively low rainfall of about 70 in. a year and a long dry season, is described. It includes the use of so-called pre-nurseries, which take the form of shallow trays raised above ground for the protection of newly germinated

seedlings during the first few months of their lives against attack by ants and other pests. Full experimental evidence on which the technique is based will be published later.

931. GALT, R.

Methods of germinating oil palm seeds.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 76-87, bibl. 13, illus.

Among various methods that have been suggested for accelerating the germination of oil palm seeds the only one which has consistently given good results has been that of sowing the seed in a moderately moist, adequately aerated medium maintained at about 35° C. (95° F.). Various methods used at one time or another are described in detail. These include unmodified seed-beds, warm or fermentation beds, raised trays, heated trays, oven-type germinators, and large germinators heated indirectly by flues or hot water pipes. Both oven-type and water-heated germinators are described with the aid of plans, and the mode of operation is described in each case. General notes are given on the preparation of seed, time and method of sowing, and subsequent treatment and inspection.

932. ANON.

The cost of establishing an oil palm plantation.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 92-4, bibl. 2.

In 1950 the West African Institute established an area of 100 acres to gain experience, especially with regard to economics, of planting oil palms on a large scale. One-third of this area was opened by the non-burning technique and two-thirds by burning. The costs of the various operations are set out, the total being 96.52 man-days per acre, of which underbrushing and felling accounted for 55.16 man-days. These figures are discussed in relation to earlier, considerably lower figures published by the former Oil Palm Research Station in 1942 and to figures reported from the Belgian Congo.

933. TOOVEY, F. W.

Field planting of oil palms.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 68-75.

Investigations on planting oil palms indicate 3 essentials: (1) plant seedlings with a ball of earth (only 0.9% supplies needed compared with 49.1% for bare root planting); (2) plant early in the rainy season to obtain the best percentage and also vigour of survivors; and (3) protect the seedlings against rodents, notably *Thryonomus swinderianus*. In a replicated trial on methods of rodent control, fencing and wire-netting collars provided almost complete protection, but painting the bases of seedlings with tar resulted in more attack (36.7%) than in the controls (23.3%).

934. I.R.H.O.

Diagnostic foliaire du palmier à huile. (Leaf analysis of oil palms.)

A.R. Inst. Rech. Huiles Oléag. 1952, 1953, pp. 32-6.

Investigations in 1952 (1) confirmed the critical levels previously fixed for N (2.75%), P (0.15%) and K (1%); (2) explained the general lack of response to P fertilization in Africa (leaf P everywhere superior to that in

the Malayan experiments in which P fertilization gave responses); (3) showed the relationship between the responses to K, Ca and Mg; (4) enabled the provisional fixing of critical levels for Ca (0.6%) and Mg (0.24%); and (5) showed that the elements studied can be separated into 2 classes, the protoplasmic elements N and P for which the ratio N/P is very constant at 16, and the basic elements K, Ca and Mg of which the total content very often approximates 2%, but the ratios of which vary according to antagonisms within narrow limits.

935. I.R.H.O.

Études spéciales. (Special studies [on oil palms].)

A.R. Inst. Rech. Huiles Oléag. 1952, 1953, pp. 44-55.

Plant physiology. Mineral nutrition (pp. 47-50). In studies made at Pobé in connexion with leaf analysis (1) the effect of ageing in the leaf and the consequent need of comparing leaves of the same physiological age were shown; (2) the variation in major element content in the leaves during the course of the year was investigated; (3) the best season for taking leaves for analysis was found to be the end of the dry season; (4) a comparison of the mineral contents of palms of different ages showed that there is a distinct fall in K 5 years after planting and that K fertilization is necessary after that age to prevent deficiency; (5) the low K leaf content in bearing palms compared with sterile pisifera was found to be due to greater translocation of K to the inflorescences.

936. PURVIS, C.

Controlled pollination of the oil palm.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 60-7, bibl. 8, illus.

Following a review of the literature on methods of artificial pollination that have been used on oil palms the technique at present in use at the West African Institute for Oil Palm Research is described. Aspects covered include the bagging of inflorescences, collection and storage of pollen, fruit set and harvesting and depulping. Pollen kept in desiccators will remain fresh for several months. Fruit sets from controlled pollinations are variable, and, though often good, are nearly always lower than those from natural pollination, and further improvements in technique would be of assistance in seed production schemes.

937. WATERSTON, J. M.

Observations on the influence of some ecological factors on the incidence of oil palm disease in Nigeria.

J. W. Afr. Inst. Oil Palm Res., 1953, No. 1, pp. 24-59, bibl. pp. 4½, illus.

A detailed account is given of a preliminary survey made in 1948 of oil palm diseases in Nigeria and the Cameroons. Considerable attention is paid to the ecology of natural palm groves. It is tentatively suggested that the fresh water swamp forest may be a natural habitat of oil palms, which under these conditions appear to be free from disease. Two contrasting types of habitat, designated Homestead and Farmland, occur in man-made clearings in the forest region. The former enjoys fire protection and contains the healthiest palms, whereas the latter may suffer degradation in proportion to the degree of population pressure on the land. With

shifting cultivation and changes in human habitation sites one form of palm habitat is apt to be transformed through a series of intermediate stages into the other and *vice versa*. The large number of fungi and bacteria found associated with the oil palm are listed. The discovery by Wardlaw [see H.A., 20: 3244] of the potentially dangerous vascular wilt disease caused by *Fusarium oxysporum* suggested the need for the survey, but this disease was not found in native palmeries though it was present in varying intensity in three European plantations. The chief diseases affecting oil palms appear to be associated with nutritional deficiencies. The most common and characteristic symptom is a necrotic leaf spot, which has been variously named Nkwele yellows, bronzing and speckled bronzing, but which the author prefers to call orange spot to distinguish from true bronzing, the symptoms of which are hyperplastic, and from chlorosis, the symptoms of which are hypoplastic. The incidence of orange spot and of trunk rot caused by *Ganoderma lucidum* was found to vary in indigenous palmeries according to the previous history of the habitat and its treatment by man.

938. KOVACHICH, W. G.

Little leaf disease of the oil palm (*Elaeis guineensis*) in the Belgian Congo.

Trop. Agriculture, Trin., 1953, 30: 61-9, bibl. 2, illus.

Further study of the little leaf disease of oil palms [see H.A., 23: 2282] in a replanted area of young palms subjected to several treatments suggests that the cause is probably physiological and possibly associated with a nutrient deficiency or unbalance. From a study of leaf development in healthy and diseased palms the latest possible date at which the latter first became affected could be calculated.

Papaws.

(See also 427, 844, 1017c, n, o.)

939. CHATEAU, R.

Pathologie du papayer. (Pathology of the papaw.)

Fruits et Prim., 1953, 23: 273-7, bibl. 25, illus.

This review article gives notes on the following diseases of the papaw and their control: (1) virus (bunchy top, ringspot, dieback, yellow crinkle and Bombay mosaic); (2) fungus (root diseases—*Pythium* spp. and *Phytophthora* spp., leaf diseases—*Asperisporium caricae* and *Mycosphaerella* sp., fruit diseases—anthracnose (*Colletotrichum* sp.), *Ascochyta caricae*, powdery mildew (*Sphaerotheca* sp.), black mould (*Rhizopus nigricans*), and rots due to *Pucciniopsis caricae*, *Oidium* sp., *Rhizoctonia* sp. and *Lasiodiplodia theobromae* (black rot); (3) nematodes, mainly *Metaphelencus* spp.; and (4) various abnormalities of leaf, flower and fruit.

940. AKAMINE, E. K., AND ARISUMI, T.

Control of postharvest storage decay of fruits of papaya (*Carica papaya* L.) with special reference to the effect of hot water. Proc. Amer. Soc. hort. Sci., 1953, 61: 270-4, bibl. 7, being Tech. Pap. Hawaii agric. Exp. Stat. 263.

Experiments were carried out in Hawaii on the control of anthracnose rot (*Colletotrichum* sp. or *Gloeosporium*

sp.) which causes decay on ripening of papaw fruits. Effective control was obtained by treating the fruits with hot water at temperatures of 110° to 120° F. for 20 mins before the fumigation with ethylene dibromide required by the quarantine regulations of the U.S. Department of Agriculture. The rate of ripening, aroma, taste, and appearance of the fruit were not materially affected by the hot water treatment. Detergents, fungicides, food preservatives and volatile chemicals did not control anthracnose. J.S.

Pineapples.

(See also 82, 594, 836, 837, 844.)

941. PY, C., AND BARBIER, M.

La production de l'ananas en Guinée en vue de l'exportation en frais. (The production of pineapples in French Guinea for export as fresh fruit.)

Fruits d'Outre Mer, 1953, 8: 363-92, illus.

Fresh pineapples from French Guinea are finding an expanding market in France and North Africa. The season lasts from October/November to July, but in some years nearly 70% of the crop is obtained in May/July and there is a smaller peak in March. Notes are given on the characteristics desired in export fruit and on the following injuries to which the fruit is liable during development and their control: sun scorch, split, "pineapple yellow" or uneven ripening, damage by scale insects (*Diaspis boisduvali* and *Pseudococcus brevipes*), crickets, rodents and monkeys, and brown rot (*Thielaviopsis paradoxa*); and on harvesting, grading, wrapping individual fruits, and various forms of pack.

942. MITCHELL, P., AND CANNON, R. C.

The pineapple.

Qd agric. J., 1953, 77: 62-84, 125-38, illus.

This article covers history, producing districts and varieties cultivated in Queensland, selection, land choice and preparation, plantation layout, planting material, planting, manuring, trace element deficiencies, weed control, irrigation, crop and plantation management, and harvesting.

943. MALAYA DEPARTMENT OF AGRICULTURE.

Notes on current investigations. January and March, 1953. Pineapple.

Malay. agric. J., 1953, 36: 120.

In laboratory propagation tests dried stem slices and dried crown segments gave 100% success in both peat and loam, young plants being established within 35 days, whereas undried slices and segments rotted. Single crown leaves rotted rapidly in peat, but remained healthy in loam for 3 months, though without producing young plants.

944. HERNÁNDEZ-MEDINA, E.

The beneficial effect of filter press cake on pineapple growth, development, and production. I. Effect on the plant crop.

Idem. II. Effect on the ratoon crop.

HERNÁNDEZ-MEDINA, E., LUGO-LÓPEZ, M. A., AND CIBES-VIADÉ, H. R.

The beneficial effect of filter press cake on pineapple yields under field conditions.

J. Agric. Univ. Puerto Rico, 1953, 36: 255-80, bibl. 14, illus.; 36: 281-301, bibl. 10, illus.; and 37: 206-12, bibl. 3.

An abstract of the first 2 papers is given in *H.A.*, 23: 2288. Data from 2 field experiments located in typical pineapple growing areas in the northern and interior regions of Puerto Rico are reported in the third paper. The authors summarize their results as follows: "Pineapple plants grown in soil to which filter-press cake was applied previous to planting developed vigorously and were of a dark-green colour. Their leaves were wider and their stems and flower stalks thicker than those of pineapple plants given other treatments. At one location, Arecibo, pineapple plants grown in soil receiving at least 32 tons of filter-press cake to the acre, in addition to 1,500 pounds of a 12-6-10 fertilizer, produced yields as high and fruits as large as plants grown in soil receiving twice as much fertilizer but no filter-press cake. Omissions of nitrogen or filter-press cake resulted in reduced yields. The possibility of using filter-press cake more extensively in pineapple fields in the Arecibo and related areas, in conjunction with smaller doses of fertilizers than are generally used, deserves careful consideration from the growers. At the second location, Corozal, 3,000 pounds of fertilizer in addition to 32 tons of filter-press cake to the acre proved to be necessary for maximum yields. Omissions of both potash and nitrogen are detrimental to pineapple production."

945. CONTOIS, D. E.

Microflora of the rhizosphere of the pineapple plant.

Soil Sci., 1953, 76: 259-72, bibl. 11.

A method is presented for the quantitative-qualitative characterization of the microbial populations of a rhizosphere through the calculation of ratios of arbitrarily defined nutritional groups to one another. A series of experiments was carried out to ascertain the more general factors that affect the microflora of the rhizosphere of the pineapple plant. The following results were obtained: 1. A distinction between the microbial populations of the inner and the outer rhizosphere is not disclosed by the quantitative-qualitative methods employed in this study. 2. At any given time there is no interaction between the ratios of the nutritional groups and plant age, but the over-all rhizosphere effect is influenced by the age of the plant. 3. The relative abundance of the various nutritional groups of bacteria to one another changes with planting time (season), as does the rhizosphere effect. 4. Apparently there is no difference in the bacterial flora of the rhizospheres of plants grown in [two areas of Hawaii] Wahiawa and Helemano, although a suggestive difference in the fungus flora is noted. A beginning to the qualitative characterization of the microflora of the rhizosphere of the pineapple plant was made also. The most common species of heterotrophic, aerobic bacteria and filamentous fungi encountered in the rhizosphere of plants of various ages grown under standard plantation practices are listed. [Author's summary.]—Univ. Hawaii.

946. MILLER, E. V., AND HALL, G. D.

Distribution of total soluble solids, ascorbic acid, total acid, and bromelain activity in the fruit of the Natal pineapple (*Ananas comosus* L. Merr.).

Plant Physiol., 1953, 28: 532-4, bibl. 11.

The data presented indicate "that in the so-called

mature pineapple, the basal segment is more mature than the middle portion, and this in turn is more mature than the top segment. This result is also confirmed by the progressive decrease in bromelain activity from top to bottom since it has been reported . . . that activity of this enzyme tends to decrease with maturity of the pineapple fruit. It is apparent, therefore, that physiological breakdown in pineapples is associated with physiological maturity. . . This observation is borne out by the fact that pineapples which have been chilled while green may not show definite symptoms of physiological breakdown until they become ripe."—Univ. Pittsburgh, Pa.

Rubber trees.

(See also 833, 834, 1016f, i, m, r, u, x, y, 1017d, i, x, 1054.)

947. RUBBER RESEARCH INSTITUTE OF MALAYA. *Annual Reports for 1949-51 of the Botanical Division of the Rubber Research Institute of Malaya*, 1953, pp. 112.

Breeding and selection. Propagation and planting technique: preparation of planting material, stock-scion relationship, density of planting and distribution, influence of selective thinning out, mixed planting of hevea and other crops, method of new planting and replanting based on the destruction of the tree by poisoning. *Tapping:* systems on seedlings and budded trees, slaughter tapping. *Latex physiology:* nutrition, flow in response to tapping, fundamental research, influence of injected substances on yield and properties of latex, yield stimulation, stimulation of bark renewal. *Ecology:* association of hevea and indigenous flora, establishment of indigenous or introduced species in planted area, ecology of mixed cultivation.

948. RUBBER RESEARCH INSTITUTE, CEYLON. *Report of the Work of the Rubber Research Board in 1952*, Colombo, 1953, pp. 102.

Chemist: latex—determination of d.r.c. of ammoniated latex, effect of ammoniation on d.r.c., calculation of d.r.c. from observed total solids, approximate determination of d.r.c. of fresh latex. *Botanist:* clone and clonal seedling trials, crown-budding effects on budded centre section, "hedge" planting. *Agronomist:* estate manurial trials, foliar analysis as a rapid indication of gross deficiencies in young trees due to unsuitable fertilizer mixtures. *Mycologist:* oidium—sulphur dusting and spraying trials, equipment for dusting and for spraying from the ground and the air; crown budding and artificial defoliation studies.

949. INSTITUT DES RECHERCHES SUR LE CAOUT-CHOUK EN INDOCHINE (I.R.C.I.). *Rapport annuel 1952. (I.R.C.I. annual report 1952.)* Laikhé, 1953, pp. 148.

Agronomic Experimental Division: selection, stock-scion relationships, study of trees in paired lines, tapping systems, spacing. *Anatomy and Physiology Laboratory:* injections for yield stimulation, early selection tests based on number of laticiferous layers, leaf analysis [see separate abstract]. *Phytopathology Division:* tapping panel disorders. *Chemistry Division:* variation in latex according to season and plant origin. *Laikhé and Tapao Experimental Stations.*

950. WESTGARTH, D. R. *Methods of improving precision in hevea trials.* *Arch. Rubbercult.*, May 1953, *Extra No.*, pp. 180-90, bibl. 3.

Subjects discussed are optimum size of plots, plot shape, number of replications, block shape, tapping tasks, drainage, choice of appropriate statistical design, balanced incomplete blocks, latin squares, factorial experiments and confounding, split-plot experiments, lattice designs, cubic lattices and covariance.

951. YOUNG, H. E. *High rubber yields on the hills—successful experiment by R.R.I.* *Quart. Circ. Ceylon Rubb. Res. Inst.*, 1952 (issued 1953), 28: 20.

L.C.B. 870 alone has shown itself resistant to oidium in clonal trials opened in 1941-42 at Kepitigalla at 1,600 feet. It has grown with vigour comparable to the most vigorous low country rubber and without loss of leaf. Yield results to date are promising.

952. PICHEL, R. *Le greffage de l'hévéa et l'influence du climat. (The effects of climate when grafting hevea.)* *Bull. Inf. INEAC*, 1953, 2: 203-8.

The main object of this study conducted at Yangambi in 1950 and 1951 was to determine the effect of certain climatic factors on the rate of "take" of grafts at cutting back and at transplanting. Except for May (54% take) no month in the year was really unfavourable. August (83-90%) and September (74-89%) were the best, a circumstance which is very convenient for transplanting in September-October, the rainy season. Monthly variations at transplanting were much greater, the best results (80-100%) being obtained in September-November (August-October grafting) while those of January-March were much lower (maximum 65%). In addition it was found that there was a slight advantage in grafting during the hotter hours of the day (85% take at 12.30 p.m. compared with 80% at 6.30 a.m.) and a marked advantage in opening and cutting back after 20 days (77% take after 50 days, i.e. just before transplanting) instead of opening at 10 days and cutting back at 20 (63%).

953. GREGORY, L. E., IMLE, E. P., AND CAMACHO, E. *Transplanting three-component hevea rubber trees.* *Proc. Amer. Soc. hort. Sci.*, 1953, 61: 311-16, illus.

Experiments were carried out in Costa Rica to reduce tree mortality in transplanting hevea rubber trees budded twice for protection against South American leaf blight. It was found that wrapping the stems with paper combined with tipping and defoliation effectively reduced mortality by protecting the stem from desiccation and scalding. Planting in the wet season proved to be as effective as wrapping in the dry season, but wrapping was beneficial even in the wet season. Treatment with NAA was less effective but should be considered in further tests. J.S.

954. BOCQUET, —.

Notes sur l'expérience de densité Marchal appliquée à l'hévéaculture. (Notes on the Marchal spacing trial as applied to rubber growing.)

Arch. Rubbercult., May 1953, Extra No., pp. 194-9.

In a Marchal spacing trial the trees are planted in lines in a fanlike design inside a rectangular trapezium. On the short base the lines are close together and on the long base far apart. Transversely, the trees are planted in lines parallel with the bases and are progressively farther apart proceeding from the short to the long base. The design permits the study on a comparatively small area of a range of densities much wider than in the conventional designs.

955. RUBBER RESEARCH INSTITUTE OF MALAYA.

Fertiliser treatment and maintenance for young replantings.

Plant. Bull. R.R.I.M., 1953, No. 9, pp. 120-3.

A schedule of manuring is given for young rubber up to 5 years old on inland soils in Malaya. Rock phosphate should be applied on planting and subsequently one of four mixtures dependent on soil texture at rates varying with age. For the first 3 years the fertilizer should be applied in a ring near the limits of root development and lightly scratched in; subsequently it should be given in pockets, at least 6-8 per plant. Backwardness, cover crops and weeding are also discussed. The article replaces *Circs* 30 and 31 and *Adv. Leaflet*. S.A.L 11/50.

956. RUBBER RESEARCH INSTITUTE OF MALAYA.

Yield maintenance of mature rubber trees.

Plant. Bull. R.R.I.M., 1953, No. 8, pp. 95-102.

This article discusses the various aspects of manuring mature rubber. The economics of replanting old rubber are also considered, the costs being compared with those of retaining and manuring the old trees over a period of years, until the replantings come into tapping. It is concluded that there is a clear advantage in replanting since the capital expenditure should have been completely recovered after about 15 years.

957. INSTITUT DES RECHERCHES SUR LE CAOUTCHOUC EN INDOCHINE (I.R.C.I.).

Diagnostic foliaire. (Leaf analysis.)

A.R. Inst. Rech. Caoutchouc Indochine 1952, 1953, pp. 79-85.

The mineral elements studied were N, P, K, Ca, Mg, Cu, Mn and Fe. Only leaf P, K and Mg showed significant differences dependent on fertilization. Studies of the correlation existing between different elements confirmed the special importance of K in rubber culture and showed that (1) K, Ca, Mg and Mn are closely correlated, K being antagonistic to the other three and the ratios being K/Ca -0.851, K/Mg -0.562, K/Mn -0.664, Ca/Mg +0.637, Ca/Mn +0.739 and Mg/Mn +0.661; (2) N, Mg and Ca are also closely correlated, the ratios being N/Mg -0.322 and N/Ca -0.338; (3) K and Cu are likewise correlated under certain conditions, the ratio being K/Cu +0.417.

958. RUBBER RESEARCH INSTITUTE OF MALAYA.

Anthraxnose.

Plant. Bull. R.R.I.M., 1953, No. 8, pp. 106-7, illus.

Notes are given on hevea anthracnose (*Colletotrichum ficus*), which in Malaya occurs only under waterlogged conditions. The remedy is improved drainage; no fungicide is required.

959. VAN EMDEN, J. H.

Notes on sulphur dusting.

Quart. Circ. Ceylon Rubb. Res. Inst., 1952 (issued 1953), 28: 12-15.

Aspects discussed on the dusting of rubber against oidium include: machinery available in Ceylon, road systems, number and rate of applications, dusting technique and winter resting of the trees.

960. RUBBER RESEARCH INSTITUTE OF MALAYA.

The yellow tea mite.

Plant. Bull. R.R.I.M., 1953, No. 9, p. 126.

Natural enemies generally control *Hemitarsonemus latus* and chemical control is best avoided owing to the danger of destroying them. If chemical control is locally necessary in immature rubber areas and nurseries sulphur dusting every 5 days is recommended. This note supersedes *Adv. Leaflet*. P/AL 3 (52).

961. RUBBER RESEARCH INSTITUTE OF MALAYA.

Annual Reports for the 2 years 1949-50 of the Chemical Division of the Rubber Research Institute of Malaya, 1953, pp. 33+23.

The chemistry and physical properties of latex and its chemistry and technology were studied. Latex preservation was among the subjects investigated. "Formaldehyde was shown to be the most effective temporary preservative. Latex has been preserved for one year near the neutral point by a bactericide and a non-ionic stabilizer. A number of new materials were effective long-term preservatives when used in conjunction with ammonia. The instability of Glenshiel 1 concentrate is removed by the addition of small amounts of laurate and phosphate."

962. PHILPOTT, M. W., AND WESTGARTH, D. R.

Stability and mineral composition of hevea latex.

J. Rubb. Res. Inst. Malaya, 1953, 14: 133-48, bibl. 2, being *Commun.* 284.

The stability of latex depends on its mineral composition which can be affected by soil conditions. In the experiments described low K and P and high Mg tended to be found in conjunction with low stability.

Sugar cane.

(See also 1, 396-399, 833, 836, 837, 839, 1016a, c, e, g, h, j, n, o, q, 1017b, f, m, s, u, 1020, 1053, 1055.)

963. DU TOIT, J. L.

Annual summary of agricultural data for the sugar cane crop, 1951-52.

S. Afr. Sugar J., 1953, 37: 505-11.

The data include yield figures for the leading varieties. N: Co. 310 again proved outstanding and was followed in descending order by Co. 331, Co. 301 and Co. 281. Among minor varieties Co. 290 yielded particularly well.

964. I.C.T.A.

Research Schemes. Sugar.

Rep. imp. Coll. trop. Agric., Trinidad, 1950-52, 1953, pp. 34-8.

The behaviour of 6 cane varieties of current importance

—B.37161, B.34104, B.37172, B.41211, B.41227 and B.4098—under juice clarification with bentonite was examined. The first three gave the best settling juices and the last-named the worst. B.37172 gave by far the best quality juice and the best yield of sugar per acre.

965. ROUILLARD, G.

Travaux réalisés en 1951 sur diverses propriétés de l'île par le Centre Agronomique du Nord. (Experiments carried out by the Centre Agronomique du Nord, Mauritius, on various estates in 1951.)

Rev. agric. Maurice, 1952, 31: 116-26 + tables [omitted in error from H.A., Vol. 23].

This paper constitutes the 4th annual report of the Centre Agronomique du Nord. Nitrogen. Experiments confirm previous experience, and recommendations for plant cane continue to be 1 kg. N per ton of cane reaped (minus 10 on the total), with 15 kg. per arpent added if planted without organic manure; and for ratoons 10 kg. N per arpent plus 1 kg. per ton of cane reaped. In experiments last year young ratoons responded better than older ratoons to N, but this now appears to have been due to some fields having been subjected to rotational cropping beforehand. Figures show that even in rotated fields sugar yields fall when more than 30 kg. N per arpent is used, the cane yield increase being insufficient to compensate for the fall in the extraction rate. Experiments show that the use of $(\text{NH}_4)_2\text{SO}_4$ rather than NaNO_3 is beneficial, especially in irrigated areas where the difference in yield was $1\frac{1}{2}$ tons per arpent in favour of the former, and that $(\text{NH}_4)_2\text{SO}_4$ also gives a slightly higher sugar content (10.25 compared with 10.13). Organic manure. Experimental results again confirmed that molasses has little effect when applied in conjunction with high dressings of N. The superiority of mineral fertilizers over farmyard manure and scum, and the unfavourable effect of the two latter on juice quality were again confirmed. Cuttings for planting. The use of setts from old ratoons in coastal regions where planting begins in March-April is strongly recommended, not more than 2-3 being taken from each cane. Hoeing and earthing up. Four years' experiments with M.134/32 in the north showed that on gravelly soil (rainfall 35 to 60 in. per annum) earthing up showed no advantage while hoeing merely contributed to desiccation, and that on loam earthing up gave an increase of 600 kg. cane per arpent but hoeing reduced yield. Trash disposal. In 14 trials placing trash in every second interline gave only a slight increase in yield compared with spreading it over the whole surface. Herbicides. Spraying with 1 gal. 80% MCPA or 2,4-D per arpent before weeds are 1 in. high has given good control.

966. YANG, T. C., AND CHU, T. L.

A study on the field experimental technic used for sugar cane. II. Block lay-out. [Chinese, with English summary $\frac{3}{4}$ p.]

Rep. Taiwan Sugar Exp. Stat. 8, 1952, pp. 1-14, bibl. 14.

A study conducted in 1949 to determine the optimum block lay-out led to the conclusions that: (1) the minimum row length should be 8 m. and individual plots should include at least 3 rows, (2) the best plot sizes are 12×6.25 m. and 12×8.75 m. with 5-6 replica-

tions, (3) there should be less than 12 plots per block, (4) the lay-out should be as nearly square as possible, and (5) the block should be compact and lie across the rows.

967. D'EMMEREZ DE CHARMOY, D.

Études sur de nouvelles variétés de canne à sucre à l'île de la Réunion. (Studies on new sugar cane varieties in Réunion.)

Agron. trop., 1953, 8: 417-26, illus.

An account is given of the main problems and aims in breeding and selecting new canes for Réunion and of the characteristics of a number of local and introduced varieties. Data from variety trials are tabulated. Within the last few years the older varieties have been largely replaced by R.337, M.134/32 and Co. 419. New varieties showing considerable promise include local selections and varieties from Barbados, Mauritius and Queensland.

968. TAIWAN SUGAR EXPERIMENT STATION PLANT BREEDING DEPARTMENT.

Results of sugarcane varieties tests during 1951-52. [Chinese, with English summary 2 pp.]

Rep. Taiwan Sugar Exp. Stat. 9, 1952, pp. 17-52.

The results are given of trials with 17 varieties, chiefly seedlings selected from the 34 (1945)-, 35 (1946)-, 36 (1947)-, and 37 (1948)-year crosses.

969. BIRKETT, L. S., AND CAMERON, C.

Field experiments with sugar cane, XXI.

Sugar Bull. Brit. Guiana Dep. Agric. 21, 1953, pp. 1-39.

An account is given of 45 variety trials and 7 manurial trials conducted in 1952. Variety trials included variety sorting, plant cane, first ratoon and second ratoon trials. B.34104 now occupies 48% of the Colony's acreage (compared with 60% in 1952); owing to its marked susceptibility to leaf scald (*Xanthomonas albilineans*) it is being replaced by less susceptible canes such as B.37161 and B.41227. B.37161 (14% compared with 9% in 1952) has completed its experimental testing, is capable of heavy yields, and has a normally high juice quality but is at present rated as susceptible to leaf scald. B.41227 (22% compared with 13% in 1952) is used as a standard in all new trials, gives a satisfactory general performance, is a heavy yielder with a satisfactory juice quality and ratoons well but is rated as susceptible to leaf scald. In recommending varieties to the industry, resistance or tolerance to leaf scald must now be taken into account; methods of tolerance assessment are not yet very accurate, but tentative recommendations of the most suitable varieties for various districts are B.41227, B.37161, B.4098, D.37/45 and B.4373. Manurial trials. P showed no significant responses, ammonium phosphate appeared to be a slightly, but not significantly, better source of P than superphosphate of lime, and yields from placement of fertilizers showed no significant differences from those obtained by the usual method of application.

970. ANON.

The Macknade method of cane propagation.

Aust. Sugar J., 1953, 44: 754-5, illus.

A description is given of the method of transplanting

cane seedlings used at the Colonial Sugar Refining Company's cane breeding station at Macknade. Holes exactly the size of the seedling pot are cut with a drilling implement consisting of a metal cup fitted at the end of a shaft with a cross handle, and embodying a soil ejection device. The potted seedling drops smoothly into the hole without interference with the root system and the pot slips up easily. The earth requires light tamping about the plant.

971. SUN, V. G., AND LIU, P. D.

Studies on the effect of pretreatment of sugarcane seed pieces. Part V. Pretreatment and planting time.

Rep. Taiwan Sugar Exp. Stat. **9**, 1952, pp. 53-82, bibl. 15.

The variety F.108 was used in replicated experiments involving 4 seed treatments (hot water, cold water, lime water, and lime water plus $MgSO_4$) and 4 planting times (August, September, October and February). Treatments had little effect on August planting but accelerated germination and increased cane yields at all other planting times. Lime water treatment is recommended; it gave its greatest increase in the October planting. Notes are also given on sucrose content in relation to temperature during ripening.

972. PAO, T. P.

Spacing and fertilizer experiments with different varieties of sugarcane at both autumn and spring planting time. [Chinese, with English summary 1 p.]

Rep. Taiwan Sugar Exp. Stat. **9**, 1952, pp. 83-145, bibl. 21.

A statistical analysis of 9 field experiments with several varieties is given. For autumn planting the optimum densities for P.O.J. 2725, P.O.J. 2878 and P.O.J. 2883 were 26,000-30,000 per ha., for F.108 35,000-40,000, for F.134 20,000-25,000 and for N: Co.310 15,000-20,000. For spring planting the density could be raised to 30,000-35,000 for the first 4 varieties. Increases of 30% and 50% over the standard fertilizer rate (131 kg. N, 75 kg. P_2O_5 and 56 kg. K_2O per ha.) gave yield increases. The available sugar percentage was generally lowered by increasing the fertilizer rate but not by increasing the planting density.

973. LUGO-LÓPEZ, M. A., AND OTHERS.

Intercropping sugarcane with food crops.

J. Agric. Univ. Puerto Rico, 1953, **37**: 171-81, bibl. 4.

Data are presented here for two intercropping experiments, involving five sugar cane crops, conducted in an imperfectly drained alluvial soil at Rio Piedras on the north coast, and for two intercropping experiments (three sugar cane crops) conducted at Isabela on a level lateritic soil of the north-west coastal plains. At both places sugar cane was planted in rows 4 feet apart and 8 feet apart. Sugar cane was grown alone and intercropped with either soybeans, corn, native red beans, native white beans, cucumbers, cowpeas, melons, or tomatoes. Statistical analysis of the results obtained indicate that, at a planting distance of 4 feet between rows of cane, higher sugar yield can be obtained than at an 8-foot planting distance, regardless of whether the cane is grown alone or intercropped. Legume crops such as soybeans, native red beans, native white beans,

and cowpeas, can be grown advantageously with sugar cane. Cucumbers, melons, and tomatoes also can be grown in association with the young cane plants without reducing the sugar yields. Corn, however, is detrimental to the production of sugar when grown in association with the young cane plants. Such intercropping of sugar cane soil is feasible technically and economically and should receive careful consideration as a means of increasing Island food production on the same acreage. [Authors' summary.]

974. HODNETT, G. E.

The responses of sugar-cane to fertilizers in Trinidad.

Emp. J. exp. Agric., 1953, **21**: 204-16, bibl. 5.

Using experimental results obtained within the past 20 years in Trinidad, mean standard responses of plant-canes, first ratoons and second ratoons to nitrogen, phosphate, potash, pen manure, and by-products have been obtained. Responses to nitrogen have been associated with the moisture characteristics of the soils, whilst those of phosphate and potash depend rather on the quantities of these nutrients available in the soils. In this series of experiments there were no great differences in response of plant-canes and ratoons. The newer varieties showed rather greater responses than the old. Nitrogen and phosphate somewhat reduced the sugar percentage, potash increased it. [Author's summary.]

975. WANG, S. C., LAI, T. M., AND YANG, C. C.

A preliminary report of the field experiment on liming a sugarcane soil. [Chinese, with English summary $\frac{3}{4}$ p.]

Rep. Taiwan Sugar Exp. Stat. **9**, 1952, pp. 163-71, bibl. 8.

In a long-term liming experiment laid down on an acid soil in 1948 3 levels of lime were applied, all plots received equal NPK, and some received 20,000 kg. cane-leaf compost per ha. The results for the first crop period were not very significant probably owing to the coarseness of the material used. Those for the second period were: (1) liming alone increased millable cane yield and sugar yield by 32% and 36% respectively when the pH was raised to 7 compared with the control, and by 22% and 23% respectively when the pH was raised to 8, but had no effect at pH 6; (2) lime plus compost gave 29% and 19% increases respectively when the pH was raised to 8, and 13% and 10% when it was raised to 7; (3) the available sugar percentage was significantly reduced by lime plus compost but not by lime alone; (4) compost alone increased sugar yield by 12% but this was not statistically significant.

976. SUN, V. G., AND LIU, P. D.

An investigation of the water requirement of the autumn plant cane of F 134 in Tainan. [Chinese, with English summary 2 pp.]

Rep. Taiwan Sugar Exp. Stat. **8**, 1952, pp. 15-38, bibl. 16, illus.

In replicated pot experiments F.134 plants were grown at soil moisture contents of (A) 31-41%, (B) 44-55% and (C) 59-66% of field capacity. Treatment C gave the best growth and A the poorest. The order of mean yield of millable cane per plant was B C A and of available sugar C B A. The water requirement per

unit dry matter of cane varied little between the 3 treatments. A gave the lowest dry matter yield per plant and also gave more dry matter in the non-millable part than in the millable, a fact which suggests that low available soil moisture could induce uneconomical growth. Water requirements throughout life on a given soil "may be estimated upon cane yield, soil surface evaporation rate, soil moisture content and the results of the present experiment".

977. HASKEW, H. C.

The effect on C.C.S. of spraying 2,4-D on to growing cane.

Cane Grs' quart. Bull., 1953, 17: 52-3.

Spraying Q.50 cane with an aqueous solution of the sodium salt of 2,4-D at 5 and 30 p.p.m. did not affect the C.C.S. over a subsequent period of about 2½ weeks. In view of the response obtained in Cuba [see *H.A.*, 22: 4456] this negative result should not preclude a more thorough investigation.

978. CLAPIER, B. A.

Mécanisation de la canne à sucre. (The mechanization of sugar cane cultivation.)

Agron. trop., 1953, 8: 363-73, illus.

Short, critical notes are given on machines, notably planters, harvesters and loaders, in use in Hawaii, the U.S.A. and Cuba.

979. SCHAFFER, J. J.

The mechanical harvesting of sugar cane.

Sugar J., 1953, 16 (5): 12-16, illus.

The new Thomson cane harvester, briefly described here, cuts, cleans and loads cane in one operation. The cleaning and loading devices can be fitted to other modern harvesting machines.

980. WADDELL, C. W.

The topping of cane.

Sugar J., 1953, 16 (2): 24-8, bibl. 9, illus.

The various sections of a mature sugar cane stalk are defined, and ways of identifying the "normal" point of topping described. In 13 tests involving 9 varieties in Queensland the C.C.S. and apparent purity were determined for different sections of the stalk. The results indicate that the most economic point of topping is the present normal point of topping or one internode below it. Topping above or below this point results in an appreciable decrease in the net return to the grower.

981. SHARMA, S. L.

Malformations in sugarcane.

Curr. Sci., 1953, 22: 276-7, bibl. 6, illus.

The formation of "bunch tops", i.e. leafy shoots in place of inflorescences, has been reported previously in sugar cane and other graminaceous crops and has been examined at Pusa where it occurred in Co. 313. It is tentatively suggested that the cause may be partial initiation of floral primordia by short days late in the season, followed, before panicles have had time to form, by a reversion to vegetative development as the days lengthen.

982. GORDON, A.

Association of a rot disease of sugar cane and irrigation water?

Sugar News, 1953, 29: 267-8.

A rot of the last undeveloped leaf observed in the La Carlota district in 1952-53 is thought to be due to silt from overhead irrigation water and dust accumulating in leaf axils. It apparently depressed juice quality.

983. KING, N. J., AND STEINDL, D. R. L.

The relationship between varietal yield deterioration and ratoon stunting disease.*

Cane Grs' quart. Bull., 1953, 17: 64-73, bibl. 7, illus.

KING, N. J.

A cause of varietal decline.

Sugar J., 1953, 16 (5): 24-9, illus.

The history, symptoms and effects of the ratooning stunting virus disease of sugar cane in Queensland are described, and it is suggested that this disease may be an important cause of varietal decline, variously referred to as "running out" or "loss of hybrid vigour" in many cane-growing countries. The fact that some varieties, e.g. Q.28, deteriorate much more rapidly than others, e.g. Badila, may be due to differences in susceptibility. It appears from experiments with infected setts of Q.28 that the disease can be controlled completely by hot-water treatment at 50° C. for 1½ hrs or at 52-54° C. for 1 hr; at higher temperatures setts were damaged and in tests on other varieties germination was adversely affected in several cases at 54° C. for 1 hr. Control has also been achieved without injury in small batches of setts held in hot-air ovens at 50° C. for 24 hrs and at 54° C. for 8 hrs.

984. MUNGOMERY, R. W.

Obstacles to be avoided in hot-water treating cane setts against ratoon stunting disease.

Cane Grs' quart. Bull., 1953, 17: 54-6, illus.

Hints aimed at preventing impaired germination are given on the hot-water treatment and subsequent planting of setts treated against ratoon stunting disease. Among varieties that stand hot-water treatment well are N: Co. 310, C.P.29/116, Pindar, Cato and Badila. Trojan, Q.44 and S.J.4 are apt to germinate poorly especially when planted during the winter, and Q.57 and Q.50 would appear to be intermediate in behaviour.

985. BUCHANAN, W. K.

Ratoon stunting in Natal. A summary of the present position.

S. Afr. Sugar J., 1953, 37: 499-503, bibl. 6.

This virus disease has been found in Natal in the varieties Co. 301, C.281, Co. 331 and N: Co. 310, but in the last of these the symptoms are much less pronounced than in the others. There is no evidence that yields of cane have as yet been seriously affected. The symptoms of the disease and Australian experience on control are discussed.

986. ROBERTSON, J. S.

"Leaf scald" investigation.

Sugar Bull. Brit. Guiana Dep. Agric. 21, 1953, pp. 61-2, bibl. 1.

Leaf scald continues to be of major importance on all estates. B.4098 is the only resistant commercial variety. Preliminary results of trials of 27 imported breeding canes show that B.37254, B.4454, 28 N.G. 7, Dacca, Tobongo, Kloet, Pasoeroean and Local are resistant, and B.39250, B.32254, B.39274, B.41242, 32 M.Q. 579

* Paper presented to the 8th Congress, International Society of Sugar Cane Technologists.

and Kavangire are tolerant. In trials with 143 potential commercial varieties 19 have failed to show symptoms, 27 have been resistant and 34 tolerant. The results of various experiments show that: (1) rats are efficient vectors; (2) infection does not take place by root contact, through the soil or through undamaged buds; (3) the growth suppression rate in B.34104 over 15 months was 50%; (4) susceptible varieties show 35-40% yield weight reduction and a significant decrease in juice quality; (5) the pathogen in its physiological characters closely resembles *Xanthomonas albilineans*.

987. BOURNE, B. A.

Studies on the dissemination of sugar cane diseases.

Sugar J., 1953, 16 (3): 19, 22, bibl. 6.

Various micro-organisms were found associated externally and internally with *Diatraea saccharalis* and its larval parasite *Bassus stigmaterus*. These included the parasitic cane fungus *Fusarium moniliforme*. As present quarantine regulations do not apparently recognize the possibility of introducing pathogens through the importation of insect parasites and associated host stages, further studies involving other borer parasites would appear to be very desirable.

988. TSAI, T. K.

Studies on leaf scorch disease of sugarcane. [Chinese, with English summary 2½ pp.]

Rep. Taiwan Sugar Exp. Stat. 8, 1952, pp. 133-49, bibl. 14, illus.

The fatal leaf scorch disease (*Stagonospora sacchari*) was first reported in Huwei Sugar Cane Improvement Station in 1949, where it affects a number of varieties.

989. LIN, J. T.

The relation between cane varieties and leaf scorch. Part 1. The degree of susceptibility of various cane varieties. [Chinese, with English summary ¾ p.]

Rep. Taiwan Sugar Exp. Stat. 9, 1952, pp. 185-99, bibl. 2.

Notes are given on the relative susceptibility to the epidemic leaf scorch disease (*Stagonospora sacchari*) of some 400 cane varieties and seedlings raised at the Taiwan Experiment Station.

990. CHU, H. T., AND TSAI, T. K.

Studies on leaf scorch disease of sugar cane. [Chinese, with English summary 1½ p.]

Rep. Taiwan Sugar Exp. Stat. 9, 1952, pp. 172-84, bibl. 8.

No effective fungicidal method of field control of leaf scorch disease (*Stagonospora sacchari*) has yet been found. Recommendations are the burning of trash after harvest in diseased fields and the removal and burning of infected leaves before the rainy season.

991. BRENIÈRE, J.

Les principaux insectes nuisibles à la canne à sucre dans les territoires et départements français d'outre-mer. (The principal insect pests of sugar cane in French overseas territories.)

Agron. trop., 1953, 8: 354-62, bibl. 20.

The most injurious pests are the stem and root borers, which include the beetles *Heteronychus plebejus* and *Hoplochelus rhizotrogoides*, both of which do serious

damage to cane roots in Madagascar, and the moth borers *Sesamia vuteria* in Madagascar and Réunion and *Diatraea saccharalis* in most cane-growing regions. Brief descriptions are given of these and other pests, their life histories, and measures, cultural, chemical and biological, used for their control.

992. SIMMONDS, F. J.

Insect pests of sugar-cane in the French Antilles.

Trop. Agriculture, Trin., 1953, 30: 122-7, bibl. 3.

Insects observed attacking sugar cane in Guadeloupe and Martinique are recorded. In particular very serious damage is caused by *Diatraea saccharalis* despite the presence of several parasites, including *Lixophaga diatraeae* and *Metagonistylum minense*. It is suggested that the effects should be investigated of adding *Paratheresia claripalpis* to the parasite complex and of increasing artificially the populations of adult parasites at a critical time in young cane fields when borer larvae are plentiful but parasitism is comparatively low.

993. GUPTA, B. D.

BHC dust for control of sugarcane stem-borer.

Curr. Sci., 1953, 22: 319.

Preliminary tests suggest that 5% BHC dusts will materially reduce attacks on sugar cane by the stem-borer *Chilo traea infuscatellus* (= *Argyria sticticrasis*) and the root-borer *Emmalocera depressella*. Further work is in progress.

994. BOX, H. E.

The control of sugar-cane moth borers (*Diatraea*) in Venezuela—a preliminary account.

Trop. Agriculture, Trin., 1953, 30: 97-113, bibl. 8.

Since 1946 the pests of sugar cane in Venezuela, notably 5 species of *Diatraea*, have been under continuous study by the author and his staff in the Division of Entomology of the Ministry of Agriculture, with headquarters at the National Institute of Agriculture, Maracay, Aragua State. The progress made is reviewed with particular reference to the incidence of, and exceptionally high losses caused by, *Diatraea* spp. in various localities, the variable influences of native and imported races of the parasite *Paratheresia claripalpis* and the introduction and dissemination of the Amazon fly, *Metagonistylum minense*. *Metagonistylum* has proved adaptable to a wide range of ecological conditions and has been found to attack 4 out of the 5 species of borer. "But perhaps the most valuable lessons learned from this campaign are the proven fallibility of the still popular 'hit or miss' method of biological control, and that success may be achieved by perseverance even when the early indications may be far from encouraging."

995. BIRCHFIELD, W.

A parasitic nematode on deteriorating roots of sugarcane.

Plant Dis. Repr., 1953, 37: 38.

A species of *Pratylenchus* has been found in association with the *Sclerospora* disease of sugar cane in Louisiana but the relation, if any, between nematode and fungus has not yet been determined. [See also *H.A.*, 23: 4700.]

996. GIESBERGER, G., AND JACOBS, K. F.
Bestrijding van ratten en muizen met
behelp van het nieuwe rodenticide Warfarin.
(Control of rats and mice with the new
rodenticide Warfarin.) [English and Indone-
sian summaries 5 lines each.]
Bergcultures, 1953, 22: 281-3.

In trials in Indonesia Warfarin proved much more effective than phosphorus-containing materials for the control of rats and mice in sugar cane fields.

997. LOCSIN, C.

Marketing of sugarcane.

Sugar J., 1953, 16 (3): 12-18, bibl. 5, illus.

Systems of cane payment adopted in Cuba, Louisiana, Puerto Rico, Australia and the Philippines are reviewed, and a brief description given of the Viclomac sampler designed by a Philippine company for taking automatically a continuous first-expressed juice sample of each cane delivery.

Tea.

(See also 833, 837, 841, 1016k, v, y, 1045, 1050.)

998. TEA RESEARCH INSTITUTE OF CEYLON.

Annual Report of the Tea Research Institute of Ceylon for the year 1951, being
Bull. 33, 1953, pp. 49.

Chemistry and Technology: minor element nutrition, manuring, fermentation, plucking frequency, crop protection, withering materials, stalk extraction. *Physiology*: selection, effect of age of shoot on propagation, green manures, weedkillers, pruning cycle increment experiments, cultivation and weeding experiments. *Pathology*: blister blight research—dusting, loss of crop, and fish leaf plucking plus spraying experiments.

999. UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA.

Annual Administration Report, United Planters Association of Southern India, Tea Scientific Section, for 1952/53, 1953, pp. 34.

Entomology. *Helopeltis* control with DDT; acaricidal trials against red spider (*Paratetranychus bioculatus*) and purple mite (*Eriophyes carinatus*) which are becoming increasingly prevalent, their attacks showing a striking correlation in some areas with treatments with Cu fungicides for the control of blister blight; increased incidence of *Dendrothrips bispinosus* attack; rot-proofing nursery baskets with Cu salts (10% CuSO_4 the most effective). *Chemistry*. Plant food and soil amendment trials; manuring young tea. *Botanist*. Blister blight (*Exobasidium vexans*); branch canker (*Macrophoma theicola*); red rust (*Cephaleuros parasiticus*)* which is becoming increasingly prevalent; root diseases; germination hastened by fungicidal dressings*; effect of TCA herbicide on young tea. [See separate abstracts of asterisked items.]

1000. (EDEN, T.)

Proceedings of the first conference, 16th May 1953.

Pamphl. Tea Res. Inst. E. Afr. 6, 1953, pp. 30.

Subjects discussed included: tea and drought, establishment of young tea (including nursery practice),

cultivation and manuring, green manuring and shade, pruning, plucking, soil conservation and manufacture.

1001. BAHTADZE, K. E.

Some problems of the biology of the tea plant. [Russian.]

Agrobiologija, 1951, No. 1, pp. 7-21, bibl. 2, illus.

A discussion on the morphology of the tea plant, its characters including hardiness as affected by external conditions, propagation by seed and care of seedlings, pruning, and weed, pest and disease control.

1002. UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA.

Effect of seed dressings on tea seed germination.

A.R. U.P.A.S.I., Tea sci. Sect., 1952/53, 1953, pp. 31.

Field trials were conducted following upon previously described preliminary trials [*H.A.*, 22:3150]. Seed treated with Tillex and Fernasan germinated more rapidly than that treated with Agrosan G.N. and the untreated control, the percentage germination after 4 weeks being 62, 47, 37 and 35 respectively, but later development was not influenced by any of the treatments.

1003. WIDDOWS, J. O.

Vegetative propagation in relation to the replanting of poor yielding areas.

Tea Quart., 1953, 24: 43-5.

A description is given of the method by which a poor yielding area in a Ceylon tea estate was successfully replanted with vegetatively propagated material. The selection began in 1946 of some 30 mother bushes showing good yields, good liquoring, good quick rooting and resistance to blister blight. A multiplication nursery was first established and planting out began in 1949. Rooted nursery cuttings were employed and, owing to shortage of nursery space, new cuttings were also planted out direct (except during the monsoon), 3 per hole, and thinned as necessary after establishment. Watering during drought is essential in the latter case. Shade was given in all cases. Six main clones have been relied on and yields and tea-making factors have been fully maintained in the progeny.

1004. WALTER, T. E.

The principles of bringing new clearings into bearing in the low-country.

Tea Quart., 1953, 24: 39-42, illus.

A description is given of the various methods of bringing new clearings into bearing. Thumb-nail pruning in which the tips of the young plants are pinched off and the layering methods introduced on two estates are preferred to the low secateuring method which lays the plants open to the entry of wood-rotting fungi.

1005. HAWORTH, F.

The establishment of green manures in mature tea areas.*

Tea Quart., 1952, 23: 114-16, illus.

The optimum shade for mature tea appears to be that provided by an uneven-aged stand of several species. The difficulty commonly experienced in supplying it in mature tea is due to the fact that the shade trees are planted too small and cannot compete successfully with

* Actually concerns shade trees.—Ed.

the tea. In 1952 an experiment was conducted with *Albizia moluccana* and *Grevillea robusta* to determine whether larger plants could be successfully supplied. Seed was sown in February in large baskets (8 in. in diameter and 10 in. deep) in well-fertilized soil, and in the ordinary small baskets in soil alone. By the end of September when planted out, in the baskets, in mature tea the large basket plants were 2-3 times the size of the small ones. Despite adverse weather 100% survived the first month. The estimated cost per plant established in the field is about half that of the normal estate method of supplying shade trees.

1006. WRIGHT, S. J.

Report on the possibilities of mechanizing tea cultivation in Ceylon.

Tea Quart., 1953, 24: 57-64.

The author visited Ceylon under the Colombo plan to examine the possibility of mechanizing tea cultivation. An analysis is made of labour use on 5 estates. Among the main conclusions drawn are: With tea planted as at present there is little prospect of lowering production costs by mechanization. Even the fairly recently adopted system of contour hedge planting with bushes 1½ ft. apart in rows 5 ft. apart does not provide sufficient space for a tractor. A better layout would be double hedges with bushes 3×1½ ft. and 7 ft. intervals giving the same population of 5,808 bushes per acre, or better still single rows 7 ft. apart to give a population of 4,150 bushes. In addition to cultivation this would make it possible to try, if only experimentally, fully mechanized pruning and plucking using a mounted cutter bar. The use of machinery for grubbing old bushes, cutting contour trenches preparatory to re-planting and the need for experimentation and for developing certain special types of equipment are also discussed. Given suitable lay-outs in new plantings it is probable that fairly straightforward mechanization would reduce present labour requirements in most areas by at least 50%.

1007. RICHARDSON, A. E.

The field stalk clipper.

Tea Quart., 1953, 24: 48-9.

The instrument is carried suspended from the waist by a chain. The plucker, after collecting a small amount of leaf in each hand, transfers that in her right hand to her left and with her now free right hand takes the clipper and trims off the stalk from the handful of leaf in her left hand. The dry weight of the stalk clipped off is not likely to exceed the weight of reds normally picked out at the factory. The time taken in clipping off the stalk may easily be set off against the normal picking-over time at weighings. In a grading test 74% of clipper plucked tea was graded BOP compared with only 60% of normal plucked tea; in a red leaf picking test clipper plucked tea cost 54% less to pick out than normal plucked tea. The first London report on clipper plucked tea was favourable as regards dry leaf, liquor and infused tea.

1008. HOMBURG, K.

Een beschouwing over het klimaat i.v.m. de bestrijding van de *Exobasidium vexans*. (Climate in relation to control of *Exobasidium vexans*.) [English and Indonesian summaries 19 and 22 lines respectively.]

Bergcultures, 1953, 22: 345-53, bibl. 3.

The effects of sunshine, rainfall, wind and relative humidity on the development of blister blight infection are discussed. The amount of morning sunshine and the intensity of sunshine are the most important factors. Rainfall, rain distribution and cloudiness are of secondary importance. Relative humidity is determined by all these factors and is therefore used as an indication of weather conditions. Blister blight is likely to occur when the R.H. (day average) reaches 80%. During the west monsoon control measures can safely be stopped after a 5-day period of R.H. lower than 80%, but they should be started again after the next 3-day period of R.H. higher than 80%. The number of hours of morning sunshine, however, should be taken into account.

1009. LAOH, J. P., AND HOMBURG, K.

Blister-blight waarnemingen en bestrijding-sproeven in het Patuha'se. (Observations on blister blight and control experiments in Patuha, Indonesia.) [English and Indonesian summaries ½ and ½ p. respectively.]

Bergcultures, 1953, 22: 327-43, bibl. 13, illus.

In a tea estate south-west of Bandung, in a district very favourable for blister blight development, wet spraying with pressure-retaining knapsacks did not give satisfactory results. Good protection, however, was given with a Whirlwind power duster. The high price of cuprosana and other imported dusts makes their use impracticable, but good protection was obtained with locally made dusts containing 2% or 4% copper when these were applied with a power duster at the rate of 10-12 kg. p. ha. every 5-7 days. The importance of adapting the pruning and plucking methods to the requirements of spraying or dusting is stressed. An observed increase in mite infestation is attributed to the weakened condition of the bushes due to blister blight and *Helopeltis* attack, to the drastic reduction of shade, and to the increased use of insecticides and copper fungicides.

1010. LOOS, C. A.

Studies in blister blight control. XII. Dusting and spraying against blister blight on Ury Group, Passara.

Tea Quart., 1953, 24: 70-5, bibl. 2.

Two large fields, one in its first year and the other in its second, each received 4 treatments: (1) 4% cuprosana dust applied by hand dusters at about 5 lb. per acre at 5-day intervals, (2) the same applied by a power duster, (3) knapsack spraying with perenox at 4 oz. in 10 gal. water applied at about 15 gal. per acre at 10-day intervals, and (4) unprotected control. Yield records taken in the pre-blister, blister and post-blister periods did not reveal any difference in efficiency between dusting and spraying, but blister incidence measurements showed clearly that sprays gave better control than dusts. The protection of the first year field proved both necessary and economic, but in the second year field the recovery of the unprotected area during the post-blister period was such as to produce yields as high as, or higher than, those of the protected areas. The "running" cost of dusting was considerably more expensive than that of spraying.

1011. JOHNSTON, A.

Blister blight of tea in Malaya. 3. Results of further spraying experiments.*Malay. agric. J.*, 1953, 36: 81-8, bibl. 2.

Investigations at the Federal Experiment Station, Tanah Rata, Cameron Highlands, in 1951/52 indicate that spraying costs can be reduced without adversely affecting blister blight control either by extending the interval between spraying from 7 to 10 days or by reducing the strength of copper fungicide from 0.25% to 0.125%, especially if a wetting agent is added. It remains to be determined whether these two measures can be combined. The results also confirm that 10 to 20 gal. spray should be applied per acre [see *H.A.*, 22: 4489] and that copper fungicides, especially oxides or oxychlorides, are superior to all non-copper fungicides so far tested.

1012. UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA.

Stem diseases: red rust (*Cephaleuros parasiticus*).*A.R. U.P.A.S.I., Tea sci. Sect.*, 1952/53, 1953, pp. 27-9.

Red rust is becoming more prevalent in South India. Observations show that attacks are more severe on weak and debilitated bushes, on those infected with certain pathogenic fungi, on unshaded tea and in waterlogged areas. The best means of control is the maintenance of good vigour, but direct control is also essential to check build-up and can be achieved by spraying with a copper fungicide such as 1% bordeaux mixture. Treatment is only really effective after pruning, since it must be concentrated on young susceptible stems and infected branches but it can, if necessary, be applied to young and older unpruned tea. Tentative recommendations for mature tea are one spraying immediately after pruning and another in April-May, and for young tea in March-April and again in early May.

Sundry crops.

1013. PATEL, M. K., ALLAYYANAVARAMATH, S. B., AND KULKARNI, Y. S.

Bacterial shot-hole and fruit canker of *Aegle marmelos* Correa.*Curr. Sci.*, 1953, 22: 216-17, bibl. 1, illus.

The bacterium causing shot-hole and fruit canker of *Aegle marmelos* has been named *Xanthomonas bilvae* n.sp. The pathogen and the symptoms it causes are described.—*Coll. Agric.*, Poona.

1014. WINTERS, H. F., AND RODRIGUEZ-COLON, F.

Storage of mangosteen seed.*Proc. Amer. Soc. hort. Sci.*, 1953, 61: 304-6, bibl. 3.

Mangosteen seed stored for one week either dry or moist at 50° F. failed to germinate. Storage at room temperature in moistened charcoal dust gave the highest percentage of germination but was only slightly better than storage in moistened peat moss. Both treatments preserved viability for 7 to 8 weeks. Seed stored in the fruit was delayed in germinating after planting. The viability of air-dry seed was lost after 4 weeks. Seed stored in the desiccator over calcium chloride for even one week failed to germinate. [Authors' summary.]

Cover crops.

1015. PAUL, W. R. C.

Notes on legumes. III.*Trop. Agriculturist*, 1953, 109: 27-35, bibl. 9.

Observations are recorded on the behaviour of various legumes under trial in Ceylon as green manure and cover crops or as forage crops, the former including *Stizolobium aterrimum*, *Stylosanthes gracilis*, *Desmodium uncinatum*, *Tephrosia purpurea*, *Phaseolus lathyroides* (= *P. semi-erectus*), *Crotalaria spectabilis* (= *P. sericea*), *Sesbania speciosa* and several varieties of *Cajanus cajan*. [For Parts I and II see *H.A.*, 22: 3027 and 4306.]

Noted.

1016.

a ANON.

Sugar cane experiments in Trinidad, 1952.*J. agric. Soc. Trin. Tob.*, 1953, 53: 185-6. Notes on 15 fertilizer and 16 variety trials.

b BAKER, R. E. D.

Witches' broom disease of cacao (a review).*Rep. Cacao Res. imp. Coll. trop. Agric.* 1945-1951, 1953, pp. 116-18, bibl. 22.

c BARNES, A. C.

Cane sugar in South Africa.*Sugar J.*, 1953, 16 (5): 29-33.

d BARTLEY, B. G.

Outlines of the cacao-breeding programme at I.C.T.A.*Rep. Cacao Res. imp. Coll. trop. Agric.* 1945-51, 1953, pp. 24-5, bibl. 3.

e BELEY, —.

Vue d'ensemble bibliographique sur la question du diagnostic foliaire de la canne à sucre. (A review of the literature on the foliar diagnosis of sugar cane.)
Agron. trop., 1953, 8: 427-8, bibl. 9.

f VAN DER BIE, G. J.

De gele en witte fractie van verse latex. (The yellow and white fractions of fresh latex.) [French summary pp. 2.]
Conf. C.R. Journées du Caoutchouc, Brux., 1953, 1953, pp. 41-50, bibl. 10, illus.

Chemical properties of lutoids and their effects on latex and rubber.

g BONNET, J. A.

Potassium content of Puerto Rican soils as related to sugarcane growing.*J. Agric. Univ. Puerto Rico*, 1953, 37: 183-94, bibl. 10.

h BOURIQUET, G.

Les principales maladies de la canne à sucre dans les territoires et départements français d'outre-mer. (The chief diseases of sugar cane in French overseas territories.)
Agron. trop., 1953, 8: 346-53, bibl. 10, illus.

Notes on distribution, symptoms, pathogens and control.

- i BOWLER, W. W.
Electrophoretic mobility study of fresh hevea latex.
Industr. Engng Chem., 1953, **45**: 1790-4, bibl. 6.
- j BRETT, P. G. C.
Seedling selection in Natal. How varieties are eliminated in breeding.
S. Afr. Sugar J., 1953, **37**: 303.
- k CHILD, R.
The selection of soils suitable for tea.
Pamphl. Tea Res. Inst. E. Afr. **5**, 1953, pp. 10.
- l COHIC, F.
Insect pests in the Wallis Islands and Futuna.
Tech. Pap. S. Pacific Commiss. **8**, 1950, being a translation of a paper in French in *Agron. trop.*, 1950, **5**: 563-81.
- m COOK, A. S., AND SEKHAR, B. C.
Fractions from *Hevea brasiliensis* latex centrifuged at 59,000 g.
J. Rubb. Res. Inst. Malaya, 1953, **14**: 163-7, bibl. 4, illus., being *Commun.* **286**.
- n DAVISON, B. K., AND OTHERS.
Sugar cane wax, Part IV. Some observations on the effect of burning cane, of cane variety and of mud storage on wax yields.
J. Agric. Soc. Trin. Tob., 1953, **53**: 173-84, bibl. 6.
For an abstract of Part II see *H.A.*, 22: 3145.
- o DUFOURNET, R.
La culture de la canne à sucre à Namakia (Madagascar). (Sugar cane growing at Namakia (Madagascar).)
Agron. trop., 1953, **8**: 393-408, bibl. 8, illus.
Detailed notes on estate practices.
- p DUROCHER-YVON, F.
The coconut industry of Seychelles.
World Crops, 1953, **5**: 437-41, illus.
- q ENOCH, A.
La canne à sucre à la Réunion. (Sugar cane in Réunion.)
Agron. trop., 1953, **8**: 409-16, illus.
- r EVERS, E.
Pratique de la présélection en hévéaculture. (The practice of pre-selection in rubber growing.)
Conf. C.R. Journées du Caoutchouc Brux. 1953, 1953, pp. 23-30, illus.
For a longer account see *H.A.*, 23: 1310.
- s HAWORTH, F.
Continuous cacao fermentation records at San Juan Estate, 1949.
Rep. Cacao Res. imp. Coll. trop. Agric. 1945-1951, 1953, p. 109.
For 5 batches of cacao.
- t HENRY, P., AND SCHEIDECKER, D.
Nouvelle contribution à l'étude des *Elaeis* vivipares. (A new contribution to the study of viviparous *Elaeis*.)
Oléagineux, 1953, **8**: 681-8, bibl. 2, illus.
See also *H.A.*, 19: 1598.
- u VAN HEUSDEN, W. C.
Aanbevolen heveaplantmateriaal 1953/1954. (Recommended hevea planting material 1953/1954.)
Bergcultures, 1953, **22**: 359-65.
- v DE JONG, P.
Research on tea in south India.
Plant. Chron., 1953, **48**: 434-6, 439.
A historical review.
- w KADEN, O. F.
The cocoa islands San Tomé and Principe.
Gordian, 1953, **53** (1267): 25-9, bibl. 9, illus.
Including cultivation, propagation by seed, and fermentation.
- x KAIMAL, K. N.
Notes on some common diseases of the rubber tree in South India.
Plant. Chron., 1953, **48**: 516-21, and *Indian Rubb. Bd Bull.*, 1953, **3**: 37-43.
- y KANTOR PUSAT STATISTIK.
Tabellen en grafieken betreffende enige belangrijke overjarige cultures in Indonesie. (Tables and graphs concerning some important perennial crops in Indonesia.)
Bergcultures, 1953, **22**: 385-416.
Production and trade statistics for rubber, coffee and tea.
- z KILLIAN, C.
Observations sur l'écologie et les besoins édaphiques du quinquina. (Notes on the ecology and soil requirements of cinchona.)
Bull. Inst. franç. Afr. noire, 1953, **15**: 901-71, from abstr. in *Trop. Abstr.*, 1953, **8**, No. 2173.
1017.
a KOGAN, L., DiCARLO, F. J., AND MAYNARD, W. E.
Determination of caffeine and trigonelline in coffee by paper chromatography.
Analyt. Chem., 1953, **25**: 1118-20, bibl. 13.
- b LOCSIN, C. L., AND TABAYOYONG, F. T.
Field experiments Nos. 136 ('52) and 137 ('52).
Sugar News, 1953, **29**: 300-6.
A variety and a fertilizer trial in the Philip-pines.
- c MALAN, E. F.
The production of pawpaws.
Fmg S. Afr., 1953, **28**: 257-62, 274, bibl. 10, illus.
In South Africa.
- d MARON, S. H., AND ULEVITCH, I. N.
Mechanical stability test for rubber latices.
Analyt. Chem., 1953, **25**: 1087-91, bibl. 9.
- e MENON, K. P. V.
Some important coconut diseases and their control.
Bull. Indian centr. Coconut Cttee, 1953, **7**: 33-6, illus.
Root disease, leaf rot, leaf blight, stem bleeding, bud-rot, nutfall.

- f MUNGOMERY, R. W.
The campaign against Fiji disease in the Bundaberg and Moreton Areas.
Cane Grs² quart. Bull., 1953, 17: 50-1.
Progress towards eradication is good.
- g NIRULA, K. K.
Important pests of coconut palm and their control.
Bull. Indian centr. Coconut Cttee, 1953, 7: 37-41, illus.
Oryctes rhinoceros, *Nephantis serinopa*, *Rhynchophorus ferrugineus*.
- h RAO, M. B. S.
An improved method of cultivation of *Crotalaria striata*.
Bull. Indian centr. Coconut Cttee, 1953, 7: 47-50.
- i RISDON, E. J.
The bleaching of budded rubber latex by RPA.3—a progress report for Ceylon.
Quart. Circ. Ceylon Rubb. Res. Inst., 1952 [published 1953], 28: 3-12, bibl. 13.
- j RIVALS, P.
Notes sur les diverses espèces à fruits comestibles existant à l'Île de la Réunion. (Notes on the edible fruit species of Réunion.)
Rev. agric. Réunion, 1952, 52: 81-92, bibl. 2.
This concludes a series of articles noted previously in *H.A.*, 22: 45021 and 23: 3627s.
- k ROMBOUTS, J. E.
Contribution to the knowledge of the yeast flora of fermenting cacao. 1. A critical review of the yeast species previously described from cacao.
Trop. Agriculture, Trin., 1953, 30: 34-41, bibl. 17.
- l SANTINI, R., Jr.
Determination of reducing and total sugars in West Indian cherry (*Malpighia puniceifolia* L.) juice.
J. Agric. Univ. Puerto Rico, 1953, 37: 199-205, bibl. 5.
- m SHANMUKHA RAO, N., RAMACHANDRAN, K., AND ZAHEER, S. H.
Production of levulinic acid from cane molasses.
J. sci. industr. Res., India, 1953, 12B: 188-90, bibl. 9.
- n SHETTY, H. M.
The culture of papaya, *Carica papaya* L.
S. Indian Hort., 1953, 1: 35-46, bibl. 11.
In India.
- o SINGH, R. N.
Colchicine induced polyploidy in papaya (*Carica papaya* Linn.).
Sci. and Cult., 1953, 19: 44, bibl. 2.
- p STEVENS, W. L., AND FRAGA, C. A.
Análise do ensaio de desbaste de ramos inferiores do cafeeiro. (Statistical analysis of a pruning trial on the lower branches of coffee.) [English summary $\frac{1}{4}$ p.]
Bragantia, 1951, 11: 285-9, bibl. 1.
See *H.A.*, 18: 2964 and this number, abstract 910.
- q STOVER, R. H.
Measurement of colonization and survival of soil *Fusaria* in detached plant tissue.
Nature, 1953, 172: 464, bibl. 8.
On banana roots colonized by *Fusarium oxysporum* f. *cubense*.
- r STOVER, R. H., THORNTON, N. C., AND DUNLAP, V. C.
Flood-fallowing for eradication of *Fusarium oxysporum* f. *cubense*: I. Effect of flooding on fungus flora of clay loam soils in Ulua Valley, Honduras.
Soil Sci., 1953, 76: 225-38, bibl. 18, illus.
A full account of the work described in *H.A.*, 23: 2231.
- s SUN, V. G., AND CHOW, N.-P.
On the time of planting and harvesting new varieties F 134, PT 43-52 and POJ 3016. [Chinese, with English summary 3½ pp.]
Rep. Taiwan Sugar Exp. Stat., 8, 1952, pp. 39-69, bibl. 8.
- t TENDOLKAR, G. S., AND THAKOOR, N. R.
Steam activation of coconut shell charcoal.
J. sci. industr. Res., India, 1953, 12B: 221-3, bibl. 8, illus.
- u VELLY, J., AND ROCHE, P.
Étude des sols utilisés pour la culture de la canne à sucre à Madagascar. (A study of the soils used for sugar cane in Madagascar.)
Agron. trop., 1953, 8: 374-92, bibl. 9, illus.
- v VERVLOET, C.
Het tegengaan van de zuurvorming, ten gevolge van de werkzaamheid der lipase(n), in het vruchtvlees van *Elaeis guineensis*, na kneuzing, door toevoeging van chemicalien. (The inhibition of acid formation, caused by lipase activity, in the bruised pericarp of *Elaeis guineensis* by the application of chemicals.) [English and Indonesian summaries 10 and 13 lines respectively.]
Bergcultures, 1953, 22: 305-9, bibl. 9.
- w WHITE, E. V.
The constitution of sapote gum. II. Components of the methyl ether derivative.
J. Amer. chem. Soc., 1953, 75: 4692-4, bibl. 6.
From *Achras zapota*. For Part I see *H.A.*, 23: 3626.
- x WIERSUM, L. K.
Resultaten en ervaringen opgedaan bij het stimuleren van de latexproductie. (Experiments in the stimulation of latex production.) [English and Indonesian summaries $\frac{1}{3}$ p. each.]
Bergcultures, 1953, 22: 377-84, and 419-29, bibl. 11, illus.
A review [see *H.A.*, 23: 4641, 4642, 4643].

NOTES ON BOOKS AND REPORTS.

Books.

1018. AUDUS, L. J.

*Plant growth substances.*Leonard Hill, London, 1953, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. xix+465, bibls. numerous, illus., 42s.

This account of the plant hormone story can be appreciated by the reader to whom chemistry is a dim memory of "stinks" at school, or for such a one as prefers his garden to be tended by others. The urge is to don the shoes of one so disinterested, so as to share the exhilaration of such an introduction. No exacting specialist will find the presentation too elementary, but he will realize that its non-technical clarity is a measure of its high quality. That does not mean that scientific and technical terms are spurned, but after careful explanation they slip unobtrusively into place, which ensures ease of style and a delicate literary flavour.

The general arrangement and production leave nothing to be desired. From the author we have an informative table of contents, over fifty pertinent illustrations, a glossary of the main scientific terms, several factual appendices of great practical value, a well-selected bibliography, and effective subject and author indexes. From the publisher we have beautiful printing, an attractive general arrangement, and excellent reproductions. Yet all of this would have been quite unavailing if the story had been poorly told. In fact text and production are worthy of each other.

Twenty years ago synthetic growth substances were just becoming available, following the discovery of the auxin group of natural plant hormones. Till then the sequence of experiments leading to the development by Went of the *Avena coleoptile* curvature assay method had spread with spasmodic leisureliness over a period of some seventy years. Thereafter, with the chemist synthesizing hundreds of new compounds, with the horticulturist exploiting several practical uses for them, and with experiments being performed in countless laboratories all over the world, there was a rising crescendo of events to which an enormous literature now bears evidence. The hormonal concept of plant growth and development is now firmly established in glowing tribute to writings, nearly a century old, of the prophetic Sachs.

Yet the underlying mechanisms of hormone in the plant are far from being understood. One difficulty has always been the minute amounts of active substance involved, for while the sensitivity of bio-assay technique has enabled valuable studies to be made of natural hormone relations, the precise chemical changes have remained obscure. In the last few years, however, further identifications have been made, with evidence of a group of natural compounds related to the auxin indole-3-acetic acid. Furthermore, the existence of other substances giving, not the growth-promoting effect of auxin, but a growth-inhibiting effect, adds to the complexity.

Strangely enough the auxins continue to dominate the hormone-scene in the plant. Other active compounds have been identified but do not seem to share the general occurrence of the auxins. Then there are the hypothetical hormones presumed not to be auxins, notably the flowering hormone florigen, and the various calines.

Soon we may be wiser about them all, especially now that the technique of chromatographical separation is proving such a useful tool to the chemist. But, at the outset of 1954, auxin still reigns supreme and instead of appropriating the title used by Professor Hugh Nicol fifteen years before, Professor Audus might perhaps have recognized this in naming his own book. For after an introductory chapter on the nature of plant growth there follow ten chapters devoted to the manifold effects of the auxins, and even the final four chapters dealing with the flowering of plants, specific factors for the growth of separate plant parts, inhibiting substances, and growth substances in the soil, all refer in some degree to auxin relations.

All the signs are that we are on the threshold of an exciting new era in the history of plant growth substances and it is fitting that such a worthy record should have been written of what may in the future be referred to as the auxin phase, though in no way does this imply that the auxins will be dislodged from their important niche in physiological mechanism. The final word of this reviewer is warmly to commend the book to all readers of this journal.

E.S.J.H.

1019. BALDASSARI, T.

*Frutticoltura pratica. (Practical fruitgrowing.)*Vallechi, Florence, 1953, 7×5 in., pp. 188, lire 600.

This well-illustrated, popularly-written book on apple, pear, peach and plum growing is the first of a series on practical agriculture. It deals simply with multiplication and propagation, choice of site, of varieties and of pollinators, spacing, planting, training and pruning, and cultural practices, and gives notes and recommendations on varieties.

1020. BARNES, A. C.

*Agriculture of the sugar-cane.*Leonard Hill, London, 1953, $9\frac{1}{2} \times 6$ in., pp. 392, figs. 60, 42s.

In his preface Mr. Barnes writes: "The object of this book is to discuss in broad outline the varied facets of the agriculture of the sugar-cane as they present themselves to the staff of a well-organized and efficiently conducted sugar-cane plantation. The term 'agriculture' has for this purpose been used in a much wider sense than its usual dictionary definition, so that, in addition to the general picture of agricultural practices, attention is devoted to matters which directly impinge upon and affect the extensive range of field operations which are necessary to grow, reap and market sugar cane successfully and profitably." The thorny problems of peasant cane farmers and the low yields commonly associated with them, though mentioned, are not dealt with in any detail.

There can be few people so well qualified as Mr. Barnes to present a broad picture of estate practices in the cultivation of sugar cane. First as Director of Agriculture in two of the more important sugar producing colonies, then as General Manager of the largest sugar company operating in Jamaica, and finally as the first Director of the active research association established in that colony he has had an unrivalled opportu-

ity of observing the crop from many different angles. Since his retirement a few years ago he has widened his knowledge by travel, notably to the Natal sugar belt in South Africa, and, as soon becomes apparent from the book itself, has also kept very much up to date by reading and by personal contacts. These opportunities, combined with an ability to write simply and fluently, have produced a book which will be of value to the field staff on every sugar estate and in particular to all recruits to the industry.

The twenty-two chapters into which the book is divided fall naturally into four sections. In the first section two chapters are devoted to an outline of sugar cane as a major world crop and to short accounts of the principal cane growing countries. The second section consists of ten chapters which deal with sugar cane soils and their management, varieties and breeding, propagation, field planning, culture, nutrition, weed control, harvesting, and, rather sketchily, with diseases and pests. The third section contains one chapter on the methods and mechanics of irrigation and another on the mechanization of sugar cane agriculture. Finally there are eight chapters which may be regarded as being concerned primarily with estate policy and administration in that they touch on the problems of management and staffing, recruitment and education, farm and field records, cane fires and their control, payment systems for farmers' canes, the by-products of sugar cane, the planters' interests in research, planters' organizations, and the outlook for the industry.

In writing a book of moderate length on a major crop it must be difficult to ensure that all important practices are adequately covered, and at the same time to avoid the temptation to describe details of practices which are of local rather than general application. On the whole Mr. Barnes has been very successful in this. He has managed to convey a comprehensive picture within a comparatively small space, and, if there are some repetitions and details of organization that may seem superfluous to the experienced cane farmer or manager, they will undoubtedly help the new recruit to appreciate the many and complicated facets which go to make up this great industry.

There has for some time past been an urgent need for a general treatise on the agriculture of sugar cane, and this book can be recommended as supplying that need most adequately. G.K.A.

1021. FINNEY, D. J.
Statistical science in agriculture.
Oliver & Boyd, Edinburgh, 1953, 10×6½ in.,
pp. 179, bibl. 22, 25s.

Anyone who remembers studying agricultural experimentation even ten years ago knows the proliferation of books and pamphlets that purported to teach their readers statistics, the emphasis being almost entirely on techniques for the handling of data rather than on the principles of sound experimentation. If these publications have fallen into deserved neglect, the reason unhappily does not always lie in a more enlightened attitude to experimentation but in the fact that the student nowadays commonly acquires the same information from lectures. Too often he has had no opportunity to consider how new knowledge is obtained. He may be well informed but only rarely is he equipped to conduct research.

This book is to be warmly welcomed because it does set out very competently the principles that underlie good experimentation. The standing of its author is sufficient guarantee of its soundness, but more than that it is written pleasantly, lucidly and sensibly with examples admirably chosen to appeal to agricultural readers. The reviewer was particularly delighted with the apposite quotations that adorn the chapter headings and do so much to start the reader off on a useful line of thought without dogmatizing at him in the text. The author does not attempt to teach his readers how techniques are derived and, indeed, some will dislike being told so often that such and such a result is the outcome of mathematical investigation with no further explanation, but the non-mathematician must be prepared in his study of statistics to accept much on trust. Also, the author is less concerned to teach the details of statistical techniques than to explain their potentialities so that his reader will know when to seek the services of a statistician. Again some may be irritated, but this refusal to delve into too much detail is equally wise. The most useful statistical knowledge for an experimenter is a just appreciation of what statistics can do and of what he himself does not know. Even if no statistician is available, this book still has a place, deserving to be read before other works that profess to do more.

This being a review for two horticultural journals, it is unfortunately necessary to comment that on the two occasions (pages 83 and 125) on which the author leaves agriculture for horticulture, his remarks are likely to mislead. None the less this is a very good book, well conceived, well written and well printed (rather surprisingly so when it is realized that though written in English it was printed in Denmark) and the author has performed a valuable service in producing it.

S.C.P.

1022. HELLYER, A. G. L.
The encyclopaedia of plant portraits.
Collingridge, London, 1953, 8½×6 in.,
pp. 322, 21s.

Portraits of more than 1,100 plants, representing nearly 1,000 genera, form practically the entire contents. The plants, drawn from every climate, are all in cultivation in gardens or greenhouses in England. Each photograph is annotated with the botanical name, colour, height, time of flowering and degree of hardiness. The arrangement is alphabetical through the book. There is a comprehensive index of popular names and of some outdated ones still in general use. A representative collection has been assembled and in a game of "think of a genus and then look it up" it will not be found easy to beat the book.

G.StC.F.

1023. HYAMS, E. [Editor].
Vineyards in England.
Faber & Faber, London, 1953, 9×5½ in.,
pp. 229, illus., 25s.

A galaxy of experts including Hyams and Barrington Brock has combined in the making of this first serious and comprehensive treatise on the restoration of vine cultivation and wine making in southern Britain. While a single chapter is devoted to growing in the glasshouse and another to growing under cloches, the aim essentially is to show how vines were grown, and may again be grown, in this country in the open for the production

of both table grapes and wine, granted care in selection of variety and site. A comparison of the climates of S.E. England with those of Bordeaux, Reims, Dijon and Lausanne suggests that there are no very marked differences sufficient to warrant special consideration in relation to viticulture out of doors in England. Yet climate is all-important and Barrington Brock only recommends two varieties for successful production quite without cloche protection, though Hyams is more optimistic. The whole gamut of selection, cultivation, pruning, grafting, disease and pest control is here considered and found possible and finally we are instructed not only how to make wine but how to make a wine-press. For years to come our bugbear, an enquiry on how to grow vines in England is easy money. In fact when we retire . . . D.A.

1024. THE IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

A Report on Cacao Research 1945-1951.
Imperial College of Tropical Agriculture,
St. Augustine, Trinidad, and Cocoa, Chocolate and Confectionery Alliance Ltd., 11
Green Street, London, W.1, 1953, 10½ × 8½
in., pp. 132, illus., bibls., cloth bound, 25s.

To those of us who have the task of wading through increasing numbers of ever-lengthening annual reports and even quarterly reports in the search, sometimes rewarded, sometimes vain, for bits and pieces of useful scientific information, there comes eventually a feeling that too many people write far too much about far too little. Much research, and that on perennial tree crops in particular, does not provide material that is well adapted to a form of running commentary. It is therefore a pleasant change to be able to record that one organization has supplemented its annual reports by a review of progress made over a period of seven years. The Imperial College of Tropical Agriculture may be regarded as the home of research on cacao. Solid foundations for progress were laid in the early thirties. Following a relatively quiescent period during the war the much larger British West Indies Cocoa Research Scheme was launched in 1947, finance being provided jointly by the British Government and that enlightened organization of British manufacturers, the Cocoa, Chocolate and Confectionery Alliance Ltd.

How far the new research scheme has justified itself may be judged from this report. In certain fields, notably that on physiological aspects of vegetative propagation and on mineral nutrition, the contribution already made to progress is clearly outstanding and will be felt far beyond the confines of this one crop. Earlier work on the selection of improved types of cacao has yielded some useful clones, but further progress in breeding and selection is likely to be slow and steady rather than spectacular. In the fields of soil chemistry and ecology certain conclusions of much value have already been reached, but perhaps the most encouraging feature is that in the present programme of work, an attempt is obviously being made to examine the environment of the cacao tree as a whole. The long-standing problem of producing properly fermented small samples of cacao is also being investigated, and, if the results so far reported succeed in the production of acceptable and reproducible samples, the cacao breeder may in future be able to work without having at least one hand

tied behind his back. A short and rather inadequate summary of a paper on cacao enzymes seems to raise several tantalizing possibilities. In the fields of mycology and entomology progress has been limited by shortages of staff which have only recently been made good. Most of the individual papers are abstracted separately in the section of this number of *H.A.* devoted to cacao.

The presentation of the report in book form, well printed and lavishly illustrated, is an added attraction even if the resultant price is rather high. It is a pity, therefore, to have to record that there are a few signs of haste or of inadequate editing in its production. Whereas some papers present concise reviews of the results of research supported by details of methods and by data, others are much more sketchy. It may be that details and data omitted by the latter have been published elsewhere, but if so this should surely be indicated in the cited references. Here and there there are omissions or repetitions in the text which could have been avoided. Finally, is the crop concerned cacao or cocoa? The former is usually used for the tree and its fruit and the latter for the manufactured product. The research staff with occasional lapses clearly favours cacao, but the former Director of Research in his introduction uses both terms more or less indiscriminately, and, while the outer cover of the book says cacao in large gold letters, the almost equally large title on page 5 says cocoa in large black ones. Perhaps this is making mountains out of molehills, but then again perhaps it isn't.

These small defects apart the book can be most warmly welcomed both for what it contains and because it establishes a precedent which will surely be followed not only by the Cacao Research Scheme itself but by other similar organizations. G.K.A.

1025. JACOB, K. C.

Madras bananas: a monograph.

Superintendent, Govt Press, Madras, 1952,
10 × 6 in., pp. 228, bibl. 118, illus., Rs. 7 A. 6.

This is a book of very uneven quality. There is no doubt that Mr. Jacob knows the bananas of Madras genuinely and intimately, nor that his detailed descriptions of varieties, full lists of synonyms, and notes on cultural practices will be very useful locally. The descriptions, indeed, will have a much wider value. They are illustrated by numerous photographs, so that they can easily be compared with accounts of banana varieties in other countries. The nomenclature of the group is still confused, and any local monograph of this kind based on patient and accurate observation is a definite and praiseworthy contribution to international knowledge.

It is the greater pity that the author has been tempted by the wider question of specific nomenclature, which he was less well equipped to answer. Anyone who now wants to refer all edible bananas to a single species must be prepared to refute strong evidence piled up during the last twenty years in favour of a different view. Mr. Jacob has not only ignored that evidence; he has aggravated confusion by coining the unnecessary and horrible combination *Musa sapidisiaca* to cover the two distinct Linnean entities *M. paradisiaca* and *M. sapientum*. Apparently, more than sixty Latinized varietal names attached to this "species" must henceforth cumber the systematic literature of *Musa*. This is a

backward step, which will mislead beginners and annoy advanced students of the genus.

In mitigation it must be noted that the manuscript was apparently completed in 1945, and several papers on the origins and nomenclature of bananas have appeared since then. But the book is dated 1952, and one must regret that it fails to take account of findings available at least as early as 1948.

E.E.C.

1026. LEE, F. P., AND OTHERS.

The azalea handbook.

American Horticultural Society, Washington, D.C., third printing 1953, 7×10½ in., pp. 160, illus., \$3.00.

The Azalea Handbook first appeared in 1952 as a special number of the *National Horticultural Magazine* and a short note on it was given in *H.A.*, 23: 1075. It has now been reprinted as a book, with a competent subject index, and if the azalea enthusiast in the sterling area can lay hands on 3 dollars he could not find a better object on which to spend them.

1027. OSBORN, A., AND BAGENAL, N. B. [Editors].

Pruning: A practical handbook on the pruning of ornamental and flowering trees and shrubs, rose trees and fruit trees.

Ward Lock, London and Melbourne, 1952, reprinted 1953, 8×5½ in., pp. 160, illus., 12s. 6d.

This work well covers the field outlined in the sub-title; it is certainly the most comprehensive book on pruning known to the reviewer. With alphabetical lists of ornamental and flowering trees and shrubs, of roses, and of fruit trees both in the open and under glass, and their pruning requirements and methods, what more can one ask for? The list of genera of trees and shrubs alone runs to more than 400 names, of which fully one-third were previously unknown to the reviewer. Directions are given for pruning each, usually briefly, but where necessary in considerable detail. Roses are classified in 24 groups, and some of these are extensively subdivided, and long lists of variety names added. If the amateur rose grower knows, or can find out, with which group he is dealing (not always easy), he can here get all the information needed for his pruning. Fruit tree pruning, both winter and summer, is dealt with adequately, and advice is helped out by line drawings illustrating many of the points made. Fifteen full-page plates add much to the value of the work. One would think, however, that in reprinting opportunity would have been taken to correct the too numerous misprints. It might also be suggested that, if a second edition is called for, the index should be made more complete; even the subject of one of the plates, *Fuchsia riccartonia*, does not appear either in the index or in the alphabetical list of trees and shrubs; and there are other omissions. But they are small blemishes in a most useful work.

N.H.G.

1028. PASSINO, F. [Editor].

Ortofrutticoltura in Sardegna. (Horticulture in Sardinia.)

Stabilimento Tipografico Società Editoriale Italiana, Cagliari, [1953?], 10½×7½ in., pp. 118, illus.

At last we have not just a stray article but a number of

authoritative articles on Sardinian horticulture. Sardinia has never suffered the fate of Sicily and Corsica of being opened up to tourists and in certain respects has gained thereby, but the fact remains that life on this large island is still a matter of speculation even to many mainland Italians, let alone foreigners. This bulletin will give an idea of some of the excellent work which goes on, year in, year out in Sardinia. Subjects considered are future prospects in fruit and market gardening, manuring, irrigation, land reclamation, labour, transport, trade, almond growing and a very enlightening article on insect pests and diseases and their control in the island. In 1950 the chief vegetable crops were artichoke, melon, cucumber and tomato, and fruit crops, almond [see abstract 238], pear and citrus.

1029. PEARSON, C. E.

Vegetable growing.

Ward Lock, London, 1953, 8×6 in., pp. 192, illus., 15s.

This should prove a good practical book for the amateur or small market gardener. The 32 plates are works of art and the line drawings even more useful in indicating how common operations should be performed.

1030. PROEFSTATION DER C.P.V. TE BOGOR.

Handleiding voor de cacao-cultuur en cacao-bereiding. (Manual of cacao culture and curing.)

Centrale Vereniging tot Beheer van Proefstations voor de overjarige Cultures in Indonesië, 1953, 9½×6½ in., pp. 438, bibls numerous, illus., Rp. 60 (members), Rp. 120 (non-members).

This manual on all aspects of cacao production has been compiled by the Central Association of Research Stations, Bogor, primarily to supply the needs of the expanding cacao industry in Indonesia. Although the emphasis is mainly on Indonesian work and conditions, it is by no means exclusively so, for results of work from other countries have been very fully examined to complete the picture.

Each chapter is written by an expert on the subject, generally by a member of one of the research stations. An introductory chapter on the botany of cacao, including pollination and compatibility problems, is followed by chapters on climate and soils, selection, plantation culture, vegetative propagation, pests and diseases, and deficiency disorders. A long chapter on processing (about 100 pages) deals with harvesting, fermentation, chemistry and physiology of fresh, fermented and dry beans, development of aroma, problems of washing and drying, sorting, storage and transport. Finally there is a chapter on native methods of production; and here, since native production is still very limited in Indonesia, the information is based mainly on data from West Africa.

At the end of each chapter there is a useful bibliography and, in addition, a more complete bibliography is supplied at the end of the book, divided according to subject matter. Although this does not claim to be comprehensive, it contains many references not included in the separate lists. The book is copiously and usefully illustrated with photographs and line drawings, and a good subject index is provided.

It is mentioned in the Foreword that some of the contributions were completed as long as 2 years before the publication of the book. This is unfortunate but should not seriously detract from the value of this very informative, well-ordered work. P.R.-D.

1031. RAMSBOTTOM, J.

Mushrooms and toadstools. A study of the activities of fungi.

Collins, London, 1953, $8\frac{1}{2} \times 6$ in., pp. 306, bibl. 169, illus., 48 coloured and 24 black and white plates, 30s.

This book should be in the possession of all would-be poisoners, especially those who prefer to watch their victims die slowly and under considerable stress, all persons interested in coloured illustration and all gastronomes, gourmands and gourmets. It can be recommended moreover to the mythologist no less than to the mycologist, to the carefree householder with but a faint suspicion of dry rot in his house, to all interested in the advance of medicine for its simple chapter on penicillin and to the man who, having dug up all his drains regardless of expense, finds that his garden still reeks to heaven, for perhaps it is only our old and revolting enemy, *Phallus impudicus*, who pollutes the air worse than carrion and merely needs removal.

But this solid book by the leading British expert is a beautiful, not just a pretty-pretty, whimsical book. The myths or old ideas on the origin and uses of fungi are there and are cited as such. But knowledge accumulated over a lifetime of personal experience and by very wide reading of world literature enables the author to give us also a wealth of facts, many of which will be unknown even to the more erudite of his readers. Interesting and presented in vivid style they concern the following, among other, subjects: History, habitats, poisonous and edible fungi, mushroom growing, the growth of a mushroom, spore production, sex, fairy rings, rhizomorphs and sclerotia, ergot, luminosity, grasslands, marshes and sand dunes, mycorrhiza, woodlands, birds' nest fungi and other gasteromycetes, and truffles. D.A.

1032. TALBERT, T. J.

Growing fruit and vegetable crops.

Henry Kimpton, London, 1953, $9\frac{1}{2} \times 6$ in., pp. 350, illus., 33s.

Since up-to-date horticultural text books for students are not numerous any new book in this category deserves special attention. Talbert covers both fruit and vegetable growing in 340 pages; each chapter consists of about 10 pages and roughly covers one fruit or group of vegetables. The information given under each heading is necessarily brief, almost in note form, and some readers may consider that many important matters are omitted. Thus in the improvement of plants there is no mention of the use that is made of hybrid vigour in breeding sweet corn, tomatoes, etc.; in the chapters on pome fruits there is no reference to manurial needs; and deficiencies of trace elements are not mentioned as affecting any crop. In spite of these criticisms this book will obviously prove most valuable to students in Missouri and some other parts of the States and save much note-taking during lectures. The aim, to present fundamentals rather than practices, has not been sufficiently achieved to assist students outside the States

except to give them an impression of cultural methods in N. America. The chapter on the use of *Rosa multiflora* as a stock-proof fence that needs little routine care merits attention, and this plant may be worthy of trial in other countries. The book is attractively produced and well illustrated, though the lack of a bibliography is a serious omission in a textbook of this nature.

H.B.S.M.

1033. TARR, S. A. J.

Diseases of fruit and vegetables in the Anglo-Egyptian Sudan.

Bull. Minist. Agric. Sudan 8, 1952, 9×6 in., pp. 111, illus., 6s.

Following a short general chapter on the prevention and control of plant diseases, the various diseases recorded in the Sudan are each dealt with in 2 chapters devoted to fruits and 5 to vegetables. For the most part disease symptoms and control measures, where these are needed, are only described briefly or hinted at, and the book should be regarded as being of value primarily as supplying what appears to be a very full record of all the diseases, both major and minor, that have been identified as occurring in different parts of the Sudan. The inclusion of certain crops such as fig, guava and sword bean, which appear to suffer from no diseases of any kind is to be welcomed as a better method of completing the record than merely to omit mention of them. Appendixes are provided on fungicides and on a recommended list of books for further reading. Non-technical terminology has been used wherever possible, and the few technical terms that could not be avoided are defined in a short glossary. A general index and indexes of host plants and pathogens are included for ease of reference.

1034. THIELE, K. P., AND KNAUTH, A.

Die Erdbeere. Sorten, Kultur, Beschreibung und Verwertung. (The strawberry. Varieties, cultivation, description and processing.)

Landbuch-Verlag, Hannover, 1953, $9\frac{1}{2} \times 7$ in., pp. 358, 146 illus., DM. 45.

There is a surprising incongruity between the importance of the strawberry industry and the number of manuals devoted to the crop. In the circumstances the publication of this new comprehensive, balanced monograph, written especially for the practical man, will be widely welcomed by growers and nurserymen.

In Germany the cultivation of the large-fruited strawberry dates back to 1752, when the first plants introduced from England to Hanover by George II began to fruit. Breeding was not attempted until 1870, but the varieties produced since then are legion. The authors describe and illustrate 121 of them, including many old ones. British strawberries are not popular in Germany, but the latest Swiss (Wädenswil) and Scandinavian varieties are fully dealt with.

It is interesting to note how little virus-conscious a German expert, such as the senior author, can afford to be, although he is himself concerned in the inspection of parent plants for the propagation of runners. There are several statements (e.g. p. 51 and p. 226, the latter with reference to Royal Sovereign) to the effect that the degeneration of older varieties is due to continued vegetative propagation and that therefore new varieties have to be produced at short intervals. The existence of

virus diseases is, of course, not unknown in Germany—propagation at high altitudes is suggested as a palliative—but the lack of emphasis on this aspect makes itself felt in the chapter on pest control which fails to mention aphids and, above all, in the discussion of plant selection which shows that no scheme for the testing and certification for freedom from virus exists. In every other respect, however, the chapter on the selection of parent plants deserves particular commendation; it takes into account the intricate flower biology of the strawberry, drawing special attention to the occurrence of sterility and to types with predominantly male flowers. The desirability of pollinators for certain varieties is among other uncommon themes discussed in another context.

The book consists of 4 sections. I. History and origin of the cultivated strawberry (pp. 7-32). II. Cultivation and propagation (pp. 33-138), including harvesting and marketing, forcing and pest and disease control. III. Varieties (pp. 139-327), the description and evaluation of which makes up the bulk of the book. This section should be of interest to many readers, as the information assembled here on German varieties is both concise and encyclopaedic. To avoid disappointment, however, a warning must be added that most of the more recent varieties recommended for various purposes are legally protected and must not be propagated without the breeder's permission. The reviewer is glad to note the inclusion of 12 alpine varieties. IV. Processing (pp. 329-48) gives many useful hints on preservation, jam making and the preparation of non-alcoholic juice, wine and liqueur.

The book with its many line drawings and plates, several of them coloured, is excellently produced.

V.H.G.

1035. U.S. DEPARTMENT OF AGRICULTURE.
Testing agricultural and vegetable seeds.
Agricultural Handbook 30, 1952, 9×6 in.,
pp. 441, bibl. 49+pp. 18 selected references,
illus., \$4.00.

The primary aim of this manual is stated to be "to provide a working tool to be used for instruction purposes aimed at reducing the variations in test results". It covers a very large field. Among other chapter headings are: Obtaining the sample—Application of purity procedures to specific groups of seeds—Application of germination procedures to specific groups—Examination for noxious-weed seeds—Testing for trueness of variety—Identification of seeds—Development, structure and hereditary characteristics of seeds—Physiology of seeds—Glossary—Indexes of plant names, botanical and common, give easy reference to relevant pages and seed illustrations. The black and white plates illustrate 735 different seeds.

1036. WOOLMAN, J.
Chrysanthemums for garden and exhibition.
Collingridge, London, 1953, 9×6 in., pp.
112, 10s. 6d.

This should prove a useful handbook for the amateur. The writer is a well-known professional grower and the information he provides as regards cultivation, whether for commerce, exhibition or just private enjoyment is plainly to be treated with respect. All the familiar operations involved in chrysanthemum growing are

discussed and these pages teem with tips which should assist in the management of a plant so responsive to expert treatment as the chrysanthemum. Stopping and timing, for instance, which can make or mar a plant, provide a fence responsible for many falls, for each variety has its own ideas of what suits it. These obstacles are made to appear much less formidable under the clear exposition they are accorded here. For those whose interest leads them to probe further there are chapters on sports and mutations, hybridizing, factors controlling flowering and on perfume. The latter must be considered of especial moment, for until the author gave the matter his attention there were only two scented varieties, one of which had long disappeared. How it was accidentally rediscovered and how from the crossing of these two have sprung 15 to 20 varieties bearing in greater or less degree a definite fragrance, likened to that of honey and violets, is a remarkable story. The work is in its infancy. The author hopes to be able to tell us more in ten years time! There is a chapter on pests and diseases and lists of varieties for all purposes. Some of the many types are illustrated, but in the main the photographs are concerned more usefully with details of cultivation.

G.St.C.F.

Annuals and reports.

1037. CANADA, MINISTER OF AGRICULTURE.
**Report of the Minister of Agriculture for
Canada for the year ended March 31, 1953,**
1953, pp. 143, 50 cents.

Science Service: diseases and pests of tobacco, vegetables, tree and small fruits and ornamentals; herbicides, fungicides and insecticides; miscellaneous insects and nematodes. *Experimental Farms Service:* apiculture; horticulture (apple and pear varieties, orchard weed control, tomato varieties, tomato nutrition, orchard irrigation, fruit storage); tobacco. [See also separate abstracts.]

1038. CAWTHON INSTITUTE.
**Annual Report of the Cawthon Institute
1952/53,** 1953, Nelson, pp. 42.

Plant nutrition investigations: Minor elements in raspberry leaves; suspected copper deficiency in tobacco; intake of plant nutrients by hops. *Fruit research:* Boron deficiency of raspberries; magnesium deficiency of apples; zinc and copper deficiencies; apple rootstock experiments; disease investigations. *Tomato research:* Soil sterilization; glasshouse soil amendments; effect of K and N on quality of tomatoes; "cloud"; nutrient intake by glasshouse tomatoes; "hard core"; sawdust mulch. *Hop research:* Fertilizer experiments; B and Mg deficiencies; brewing value of hop varieties; disease investigations. *Tobacco research:* mosaic diseases; black root-rot; tobacco canker; verticillium diseases; cover crops; effect of fertilizers on tobacco leaf; liming; curing experiments. *Entomological investigations:* Insects damaging *Phormium*; apple-leaf midge; grass grubs attacking raspberries. [See also separate abstracts.]

1039. COMMONWEALTH SCIENTIFIC AND INDUSTRIAL
RESEARCH ORGANIZATION, AUSTRALIA.
**4th Annual Report C.S.I.R.O. for the
year ending 30 June 1952,** Canberra, 1952,
pp. 173, 10s.

Plants: introduction; diseases; fruit investigations; drug plants; tobacco; plant nutrition; plant physiology; weed control. *Irrigation*. *Entomology*: biological control; insects and viruses. *Food*: fresh fruit and vegetable storage and transport; frozen fruits and vegetables; dried vine fruits. [For details see separate abstracts in the relevant sections.]

1040. HELLYER, A. G. L. [Editor].

Amateur gardening annual 1954.

Amateur Gardening, Tavistock Street, London, W.C.2, 1953, pp. 136, 5s.

A calendar of duties for the English amateur gardener with 55 short, well-illustrated articles by experts on some of the many subjects that interest him.

1041. JOHN INNES.

43rd Annual Report of John Innes Horticultural Institution 1952, 1953, pp. 31, 3s.

Director's report: The garden area has been replanned and additions to the rose collections have brought the total of roses planted outdoors to 1,825. *Pomology Department*: Notes are given on fruit breeding, strawberry testing, hybrid *Rubi*, pear-apple hybrids, pear scab and disease resistance in tomatoes. *Genetics Department*: Studies are reported on incompatibility as a breeding tool in producing self-fertile fruit trees, intervarietal hybrids in brassicas, seed storage, leaf-mould resistance in tomatoes, rogue tomato and flower pigments. *Cytology Department*: Chromosome breakage; fruit cytology. *Garden Research Department*: Glasshouse climate; natural and artificial light; steam sterilization; methods of raising plants; and watering. [See also separate abstracts.]

1042. KAPUSKASING.

Progress Report Dominion Experimental Station, Kapuskasing, Ontario, 1941-51, 1953, pp. 86, illus.

Horticulture (pp. 53-64): Experience has shown the necessity of wind-break areas for carrying on horticultural work at this station in Northern Ontario. Since the first planting in 1917 over 160 varieties of tree fruits have been tried, but none has proved to be adaptable. Hardy soft fruit varieties are recommended, as are suitable vegetables, woody ornamentals and flowers.

1043. KENTVILLE.

Progress Report Dominion Experimental Station, Kentville, N.S., for the years 1947 to 1951, 1953, pp. 89, illus.

Weather: meteorological records. *Horticulture*: apple breeding; tree fruits; native fruits; vegetables; fruit and vegetable processing; cold storage; plant nutrition. [For details see abstracts under appropriate headings.]

1044. LAUSANNE (GALLAY, R.).

Stations fédérales d'essais agricoles de Mont-Calme et de Montagibert, Lausanne et Pully. Rapport d'activité 1952. (*Annual Report of the Swiss Agricultural Research Stations Mont-Calme and Montagibert, Lausanne and Pully, for 1952*.)

Landw. Jb. Schweiz, 1953, 2 (n.s.): 745-984, bibls.

Part I is a report of current activities, including *plant improvement*: tobacco, pome and stone fruit varieties

and rootstocks, vine, tomato, French bean, asparagus, strawberry; *manurial experiments*; *inspection of seed and plant material for vegetative propagation*; *disease and pest control*: cockchafer, San José scale, cherry fly, Mediterranean fruit fly, strawberry virus vectors and the transmission of court noué of vine; *publications*. Part II contains original communications, seven of which have been abstracted separately.

1045. LHOMME, E. J.

Rapport d'activité de la direction des recherches agronomiques et pastorales pendant l'année 1952. (*Report of the Director of Agronomic and Pastoral Research for 1952*.) *Arch. Rech. agron. pastor. Viet-Nam* 17,* 1953, pp. 87.

This report includes notes on the work of the following experiment stations: Blao (*Aleurites montana*, black pepper, tea, citrus and coffee); Xieng-Khouang (*Aleurites fordii* and *A. montana*); and Kompong-Cham (tobacco).

1046. LONG ASHTON.

Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, Bristol, 1952, 1953, pp. 302, illus.

The Director's introduction records a major change in the administration of the special work on the mineral nutrition of plants. The group of workers concerned has, from 1 April, 1952, been constituted a unit of the A.R.C., with the title of "the Agricultural Research Council Unit of Plant Nutrition (Micro-Nutrients)". Included with the report there are also author and subject indexes covering papers published in the annual reports from 1907 to 1952. In other respects this report resembles its predecessors and contains individual papers [most of them abstracted in the relevant sections of this number of *H.A.*] on pomology, plant nutrition, plant pathology, cider and the preservation of fruits and vegetables.

1047. NEW ZEALAND.

Annual Report of the Director-General of Agriculture, N.Z., for the year ended 31 March, 1953, Wellington, 1953, pp. 112.

The Horticulture Division's report covers pp. 91-112. The first part concerns general production of pome and stone fruits. Next citrus and sub-tropical fruit production is considered, sub-tropical fruits including tree tomato, passion fruit, Chinese gooseberry, and feijoa. Notes appear on small fruits. Problems facing hop and tobacco research are discussed. It is noted that peas and turnips are the only vegetable seeds produced in New Zealand in sufficient quantity to meet local needs. Progress in viticultural work is reported from the Te Kauwhata station. Progress, too, is reported from the Research Station at Levin, where experimental areas were extended and progress made in the erection of glasshouses, and the acquisition of machinery. The station is mainly concerned with small fruits. Work on bulbs at the Invermay station is developing. On the Avondale Vegetable Experimental Area a long-term experiment has been started to compare the use of municipal compost with standard fertilizers for vege-

* Previously *Archives de l'Institut des Recherches Agronomique de l'Indochine*.

table crops. Notes are given on plant quarantine regulations and greater attention is being given to the provision of cold storage facilities for fruit and vegetables.

1048. PRINCE GEORGE.

Progress Report Dominion Experimental Station, Prince George, British Columbia, 1940-1951, 1953, pp. 64, illus.

Horticulture (pp. 39-53): Because of the severe climate of the station and the area it serves horticultural investigations relate mainly to variety trials. Suitable varieties of apple, apple × crab, crabapple, pear, plum, sand cherry × plum, grape, raspberry, currant (red, white and black), gooseberry, blueberry, strawberry and 25 vegetables are recommended. Varieties of hardy ornamentals including annual and perennial flowers, bulbs, shrubs and trees, climbers and roses are listed.

1049. ROYAL HORTICULTURAL SOCIETY.

The Fruit Year Book 1954. No. 7.

R.H.S., Vincent Square, London, 1953, 9 × 6 in., pp. 116, illus., 10s.

Fruit growers who have not had the opportunity of seeing the Report of the Thirteenth International Horticultural Congress will welcome the publication in this edition of *The Fruit Year Book* of 3 of the papers presented there; these deal with fruit breeding [see *H.A.*, 23: 138], new varieties of fruit [see *H.A.*, 23: 144], and chemical and biological control of pests [see *H.A.*, 23: 520]. Some particularly interesting contributions from the research stations describe new woolly aphid resistant apple rootstocks [see *H.A.*, 23: 2554], a method of double working in which a small shield of the intermediate is inserted between the stock and scion during the budding operation [see *H.A.*, 23: 2548], and the correction of nutrient deficiencies by foliage sprays. The changes that have taken place in the fruit farming scene over the last 25 years are dramatically told by J. W. S. Mount. As usual, the special requirements of the amateur are well provided for, this time in articles on apple varieties with exceptionally decorative blossom, methods of growing vigorous apple trees in small gardens [see abstract No. 167], and the home preservation of fruit.

1050. ROYAL TROPICAL INSTITUTE, AMSTERDAM.

Inlichtengen en Onderzoekingen van de Afdeling Tropische Producten in 1952. (Information and Research in 1952 of the Tropical Products' Department.) [English summary pp. 11], 1953, pp. 63, bibls, illus., fl. 3.

Essential oils: Analyses of sandalwood oil from Tanganyika, muhuhu oil from East Africa and distilled lime oil from Trinidad. *Gums and resins*: Examination of locust gum, the resin of *Hymenaea courbaril*, from Surinam. *Oils and fats*: Particulars of niger seed (from *Guizotia abyssinica*). The composition and properties are compared of the fats from oil palm and coconut, and it is considered possible to use palm kernel fat as a partial substitute for cocoa butter. The fats of 5 other South American palms are dealt with. *Tea*: Examination of tea from Peru. A method for determining the amount

of stalk in black dried tea is described. *Fibres*: Notes on the decortication and drying of ramie fibre.

1051. RUSSELL, R. S. [Editor].

The Empire and Commonwealth Year Book 1953-4.

Published for the Empire Economic Union by the Rolls House Publishing Co. Ltd., Breams Buildings, London, E.C.4, 1953, pp. 453, 45s. or \$6.50.

For anyone who must often be in touch with different parts of the British Commonwealth this is an indispensable work of reference. It is in three parts. In the first details are given of the Sovereign and her titles, of the Colonial Office and of the Commonwealth Relations Office and of names and addresses of organizations, committees and societies concerned in different aspects of administration in the Commonwealth. Part II contains economic, statistical, geographical and historical details of 80 Commonwealth countries. In Part III production and export and import balances in the different countries with particular reference to Commonwealth trade in important agricultural and other products are considered.

1052. SOCIETY OF CHEMICAL INDUSTRY (POLLARD, A. G., AND OTHERS).

Agriculture and horticulture.

Reps Progr. appl. Chem. 1952, [1953], 37: 216-52, bibls numerous.

Among the subjects selected for this year's report there is one of outstanding interest: *Growth and nutrition of the apple tree* (A. G. Pollard), pp. 234-9, bibl. 35. This article reviews the recent literature on orchard soil management, mineral nutrition, nitrogen feeding and the trace elements zinc, boron, magnesium.—D. P. Hopkin's paper on *Fertilizers*, pp. 221-7, bibl. 33, includes references to foliar spraying (Rothamsted, Long Ashton), watercress manuring, the effect of fertilizer treatment on quality in canned peas and urea-formaldehyde fertilizers (Cheshunt).—*The trend of agricultural engineering* is briefly discussed by E. R. Hoare, pp. 246-8.

1053. U.S. DEPARTMENT OF AGRICULTURE.

Agricultural statistics 1952.

U.S. Govt Printing Office, Washington 25, D.C., pp. 876, \$2.

Cotton, sugar and tobacco pp. 75-141, oil seeds, fats and oils pp. 142-84, fruits, vegetables, and beverage crops pp. 185-334. The book is usefully prefaced by a table showing what is meant in weight by a bag, barrel, bushel, etc., according to the different products contained.

1054. U.S. DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH ADMINISTRATION (CARDON, P. V.).

Report of the Administrator of Agricultural Research 1951, 1951, pp. 497, \$1.00 [received 1953].

Following introductory remarks on administration, strategic materials and agriculture in Alaska, reports are presented by the six Bureaux of the Agricultural Research Administration, abstracts of three of which follow.

1055. HILBERT, G. E.

Report of the Chief of the Bureau of Agricultural and Industrial Chemistry.*Rep. Administ. agric. Res., U.S. Dep. Agric., 1951, 1951, pp. 33-129 [received 1953].*

The many research projects reported include: the safe moisture content of stored tung fruits; the organic non-sugar constituents of sugar cane juice; the extraction of medicinal chlorophyll from broccoli leaf meal; the synthesis of sex hormones for medicinal purposes, possibly also of cortisone, from tomatidine, which in turn is extracted from tomato plants.

1056. HOYT, A. S.

Report of the Chief of the Bureau of Entomology and Plant Quarantine.*Rep. Administ. agric. Res., U.S. Dep. Agric., 1951, 1951, pp. 251-328.*

The following, among investigations affecting horticultural crops, may be noted briefly: *Fruit and nut insects*: The progress reported in oriental fruit fly control concerns parasites, the pre-export fumigation of fruit with low dosages of ethylene dibromide and the use of bait sprays mixed with parathion; citrus blackfly control was studied in co-operation with Mexico; parathion plus spreader gave good control of scale insects on citrus; methoxychlor proved to be promising against orchard pests and Japanese beetle; new aphid and leaf hopper vectors of stone fruit and strawberry virus diseases have been identified; progress has been made in developing spray programmes for the simultaneous control of all major pecan pests and diseases; synthetic insecticides gave excellent control of plum curculio and of oriental fruit moth, in the latter case also in combination with parasites. *Truck-crop and garden insects*: Systemic insecticides were effective against aphids on pea and against red spider mites and aphids on roses and other greenhouse plants, but the health hazard involved in the treatment of food crops requires further examination; improvements in aeroplane spraying and dusting equipment are being considered; dipterous leaf miners on tomatoes and other vegetable crops were controlled by several of the new insecticides; the fungicide zineb was found to have an insecticidal effect against melon worm and pickle worm of cucumbers. *Japanese beetle*: biological and chemical control. *Control of plant diseases*: the control of phony peach disease by the destruction of leaf hopper vectors by DDT appears to be possible.

1057. SALTER, R. M.

Report of the Chief of the Bureau of Plant Industry, Soils and Agricultural Engineering.*Rep. Administ. agric. Res., U.S. Dep. Agric., 1951, 1951, pp. 345-471.*

The following are among developments relating to horticultural and plantation crops: *Rubber plant investigations* cover hevea breeding in Latin America and seed production of guayule for stock piling. *Sugar cane*: deep freezing as a means of prolonging seed viability, mechanization and new varieties, one of them resistant to brown rot (*Cercospora longipes*) are discussed. The section on *Tobacco, medicinal and special crops* includes information on diseases and curing of tobacco, seed treatment of digitalis, safflower diseases and canaigre as a source of tannin. Of the many

research projects mentioned under *Horticultural crops* only a few can be mentioned: tulip forcing under low-intensity artificial light, photoperiodism in strawberries, the control of peach and prune ripening by 2,4,5-T, mulching apples with high nitrogen hay, pruning Chinese chestnuts, leaf scorch of filberts due to Mg deficiency, tung nutrition, chrysanthemum stunt, gladiolus manuring, lily rosette disease, powdery mildew of glasshouse roses, compost preparation for mushrooms, pollination of tomatoes for hybrid seed production, storage temperatures for grapefruit and oranges.

1058. WAGENINGEN, INSTITUUT VOOR TUINBOUW-TECHNIEK.

Jaarverslag Instituut voor Tuinbouwtechniek, Wageningen, 1952. (Annual Report of the Institute of Horticultural Technique, Wageningen, for 1952), pp. 56, illus.

Many of the experiments reported are abstracted separately. Others deal with the following subjects. Materials for the construction of frame lights, wood preservation materials; various types of flower pot; coloured bird-scarers; glasshouse heating systems; the effects of droplet size and wind in sprinkler irrigation; chopped prunings as an orchard mulch; lighting for fruit sorting; heating methods for frames; electric soil heating for forced chicory; low volume spraying; composting methods; cucumber grading machines.

1059. WISCONSIN.

What's new in farm science. being 68th A.R. Part II Wisconsin Agricultural Experiment Station for 1950-51, Madison, 1952, pp. 73, illus., issued as Bull. 498.

Short, non-technical notes contain paragraphs on apple thinning, potash nutrition of cherries, weed control in canning beet and gladioli and the antibiotics antimycin, toximycin and helixin which protect tomatoes from early blight.

New periodicals.

1060. WEST AFRICAN INSTITUTE FOR OIL PALM RESEARCH.

*Journal of the West African Institute for Oil Palm Research.**[J. W. Afr. Inst. Oil Palm Res.], No. 1, 1953, 9½ × 6½ in., pp. 99, illus., obtainable from the Director, West African Institute for Oil Palm Research, near Benin City, Nigeria, or from the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, price 2s. 6d.*

The appearance of this journal, the first to be devoted solely to oil palms, may be welcomed as indicative that this most important crop is at last beginning to receive the attention that it deserves. Its appearance at this juncture also suggests that the West African Institute has got off to a good start after its inception little more than a year ago. The papers appearing in this number, including one on the Institute itself, are abstracted in the section on oil palms; they form a well balanced mixture. Publication will at first be at irregular intervals, though it is hoped to produce at least two numbers a year. May we hope that this policy will obviate the

need for padding, which in contrast to certain other commodity journals, is at present pleasantly conspicuous by its absence. Production and printing are excellent, except for a certain lack of clarity in some of the photographs, and the text is singularly free from errors. The price for these times is most modest.

Noted.

1061.

- a *Amateur Gardening Handbooks*, issued by Collingridge, London, 1953, pp. 92 each, illus., 3s. 6d. each.
Dakers, J. S., Greenhouse flowers.
Edland, H., Roses.
Jones, E. M., Greenhouse chrysanthemums.
Hunt, P. R. S., The beginner's garden.

- b BERMUDA.
Report of the Bermuda Department of Agriculture for 1952, 1953, pp. 7.

- c CANTERBURY AGRICULTURAL COLLEGE.
Annual Review for year ending 30th June 1953, pp. 101.
Pages 38 and 39 concern the Horticultural Section, apples, strawberries, glasshouse.

- d CHESHUNT.
38th Annual Report Cheshunt Experimental and Research Station for 1952, 1953, pp. 88.
Papers on research projects are abstracted separately.

- e CONNECTICUT (STORRS).
Report of the Storrs Agricultural Experiment Station for the year ending June 30, 1951, 1952, pp. 31, being *Bull.* 289.
Lists of staff and research projects in the floriculture, horticulture and vegetable gardening sections among others, but no details.

- f DANISH PLANT SERVICE FOR SEED PATHOLOGY (ANDERSEN, H.).
4. Årsberetning fra Statens Plantetilsyn vedrørende frøpatologisk kontrol, 1. april 1951-31. marts 1952. (4th Annual Report of the Danish Plant Service for Seed Pathology 1 April 1951-31 March 1952.) [English summary ½ p.]
Tidsskr. Planteavl, 1953, 56: 501-12.

- g DANISH SEED TESTING STATION (STAHL, C.).
Beretning fra Statsfrøkontrollen for det 81. arbejdsår fra 1. juli 1951 till 30. juni 1952. (Eighty-first Report of the Danish Seed Testing Station for the year 1 July 1951 to 30 June 1952.) [English summary 2 pp.]
Tidsskr. Planteavl, 1953, 56: 361-428.

- h HELLYER, A. G. L. [Editor].
The Amateur Gardening Diary and Horticultural Directory 1954.
Collingridge, London, 1953, pp. 160, 6s. 2d.
The useful mixture as before [see *H.A.*, 23: 1391].

- i INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, PARIS.
Rapport Annuel 1949. (Annual Report 1949.) 1950, pp. 163 [received 1953].
The report for 1951 has already been reviewed [see *H.A.*, 23: 3671].

- j MICHIGAN.
Sixty-fourth Annual Report of the Michigan Agricultural Experiment Station, July 1 1950 to June 30 1951, Lansing, 1951, pp. 260 [received 1953].

- k MINISTRY OF AGRICULTURE AND FISHERIES.
Farm book-keeping.
H.M. Stationery Office, London, 1953, 4th edition, 8½ × 5½ in., pp. 28, 1s.

- l PLATE, H. P., AND FRÖMMING, E.
Die tierischen Schädlinge unserer Gewächshauspflanzen, ihre Lebensweise und Bekämpfung. (The pests of glasshouse plants, their biology and control.)
Verlag Duncker and Humblot, Berlin, 1953, pp. 228, illus., from review in *Z. PflKrankh.*, 1953, 60: 476.
Not highly recommended by German reviewer.

- m REGINA.
Progress Report Dominion Experimental Substation, Regina, Saskatchewan, 1947-1951, 1953, pp. 37, illus.

- n ROYAL HORTICULTURAL SOCIETY.
Report of the thirteenth International Horticultural Congress, London, 8-15 Sept. 1952, 1953, Vol. I pp. 573, Vol. II pp. 574-1297, illus., obtainable from R.H.S., Vincent Square, London, S.W.1, £2 2s. plus postage 2s. 9d. for the 2 volumes.
The papers in this valuable report have already been abstracted or noted in *H.A.*, 23: No. 1.

- o ROYAL TROPICAL INSTITUTE, AMSTERDAM.
Twee en veertigste Jaarverslag Koninklijk Instituut voor de Tropen, Amsterdam, 1952. (42nd A.R. Royal Institute for the Tropics, Amsterdam, 1952), 1953, pp. 66, illus.
See also abstract 1050.

- p SEYCHELLES.
Annual Report of the Seychelles Department of Agriculture for 1952, 1953, pp. 34.

- q SIERRA LEONE.
Annual Report of the Sierra Leone Department of Agriculture for the year 1951, 1953, pp. 25, 1s. 6d.

- r WISCONSIN.
What's new in farm science, being 69th A.R. Part I Wisconsin Agricultural Experiment Station for 1951/52, Madison, 1953, pp. 80, illus., issued as *Bull.* 500.
See also abstract 1059.

